

MINING WORLD



in this issue

Calera's Cobalt Mill

Page 40

Rock Tunneling Speed...

hits a new high when Eimco RockerShovels are used.

Dependable, efficient and fast, Eimco's work every shift. They're easier and safer to operate.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines
EXECUTIVE OFFICES AND FACTORIES - SALT LAKE CITY 10, UTAH, U. S. A.

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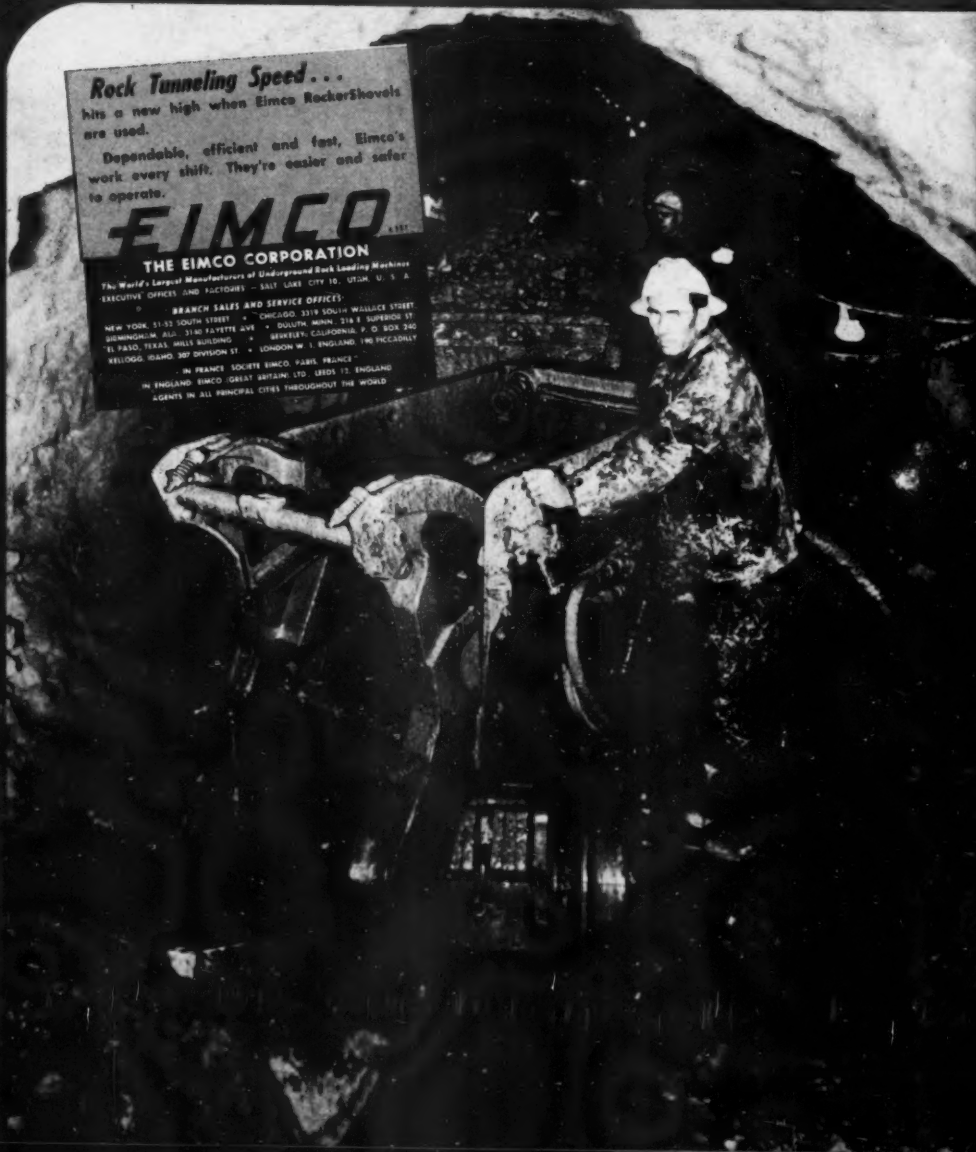
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AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

NOVEMBER 1951

V. 13 No. 12

35 cents a copy
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"Let the shovel go . . . but hang on to that DIPPER"

When the preference for an Amsco Dipper is so strong that a superintendent at one of Minnesota's largest iron mines quietly removes it from a shovel being shipped to another mine, there are apt to be some good performance reasons why!

The superintendent reported that this AMSCO 6½ yard renewable lip dipper loaded a record number of tons per 8 hour shift—more than had ever been loaded before. And, where other dippers needed repairs every 2 months or so, it is still going strong after 6 months of service with no repairs of any kind!

Better design and construction are the reasons for this high production and longer, uninterrupted service. The wide mouth and shallow depth permit faster, easier digging and loading, and a 4-way taper insures clean dumping every time.

And, this dipper is *all-cast*—of tough, work-hardening AMSCO Manganese Steel. The re-

newable lip and heel plate, when finally worn, are replaceable in a matter of minutes.

Dippers can—and should be—bought with an eye to higher digging efficiency and lower costs per ton . . . and the moral of this actual on-the-job example is clear . . .

WHEREVER YOU MEET A PROBLEM OF WEAR CAUSED BY IMPACT AND/OR ABRASION . . .
 . . . find out about longer-lasting, dollar-saving Manganese Steel Dippers made by AMSCO . . . world's largest producer of manganese steel castings for all industry.

AMSCO controls impact and abrasive wear in 5 basic industrial operations:



Power Transmission



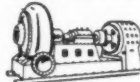
Mining and Excavating



Transportation



Crushing and Pulverizing



Materials Handling

Brake Shoe

COMPANY

AMERICAN MANGANESE STEEL DIVISION

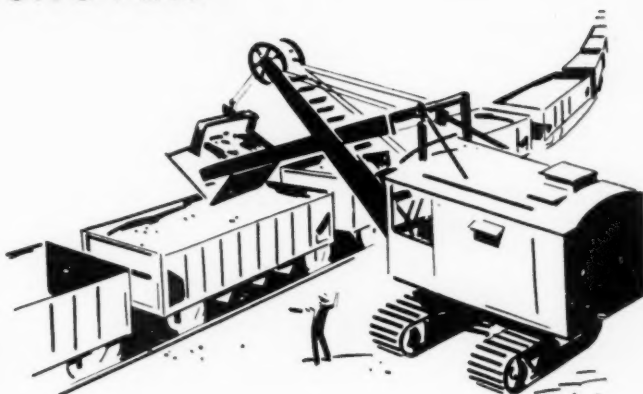
425 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.

power-hungry shovels

need **ANACONDA**

BUTYL-INSULATED



SECURITYFLEX Cable

Butyl insulation gives Securityflex* Cable:

*Higher dielectric strength; better electrical characteristics.
Greatly increased resistance to heat (rated at 80° C.)*

Butyl insulation plus tough neoprene jacket gives Securityflex:

*Outstanding protection against impact, crushing,
twisting and abrasion.
Ability to withstand moisture, acids, oils, ozone, flame.*

Its special "copper-cotton" shield eliminates failures due to chafing and makes splicing faster and easier.

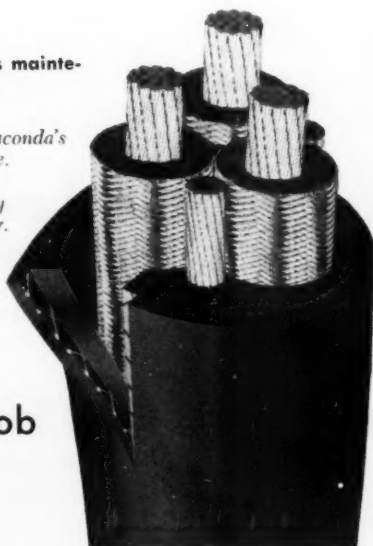
Its patented rubber-cored ground wires resist kinking, give more contact with conductor shield and provide a cushioned construction that positively prevents ground wires from cutting insulation!

51348

This means more safety, longer service, less maintenance, fewer power interruptions and hence more production at less cost.

Investigate the outstanding performance of Anaconda's Butyl-Insulated Securityflex Type SHD Cable. Let Anaconda's shovel-cable service specialists demonstrate it. Get in touch with your nearby Anaconda Sales Office or Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Reg. U. S. Pat. Off.



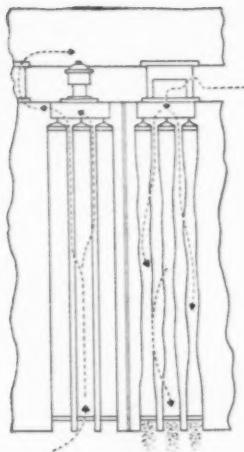
the right cable for the job

ANACONDA[®]
WIRE AND CABLE

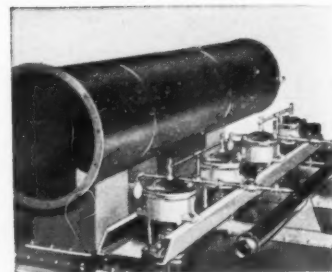
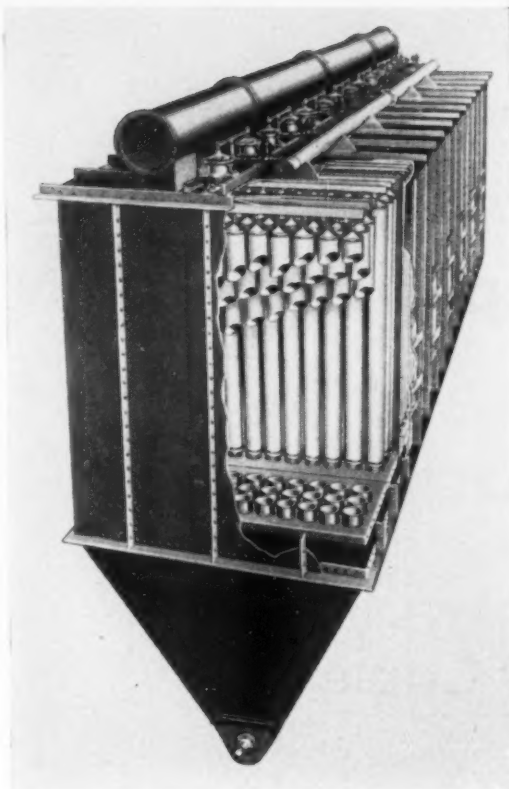
NOVEMBER, 1951

[World Mining Section—1]

1



Shown above dust laden air moving upward, distending bags. Right half of cut shows reversed air current as bags are shaken and cleaned. At right the exterior of entire unit.



Close-up of automatic shaker units and an air reversal valve. Norblo bag shaking involves only one compartment at a time for only 10 seconds. Timing cycle is variable for dust loading, without shutting down.

Dust Control For Full Production

In a number of presently very important industrial jobs Norblo automatic bag type dust and fume collectors are making new records for high efficiency. The basic principles of bag cleaning, one compartment at a time, with combined shaking and air reversal, are shown above. Norblo automatic cleaning is variable for dust load; timing can be changed without shutting down the unit, and any compartment can be cut out for inspection or bag repair.

All of these features permit continuous heavy duty operation with maximum capacity of the cloth area.

Most of the modern smelter bag houses in North America, and most of the important cement and rock products plant installations in this country, are using Norblo dust collecting equipment.

Norblo also builds centrifugal and hydraulic dust collectors, exhaust fans and cement air cooling systems. Write for literature on any of these

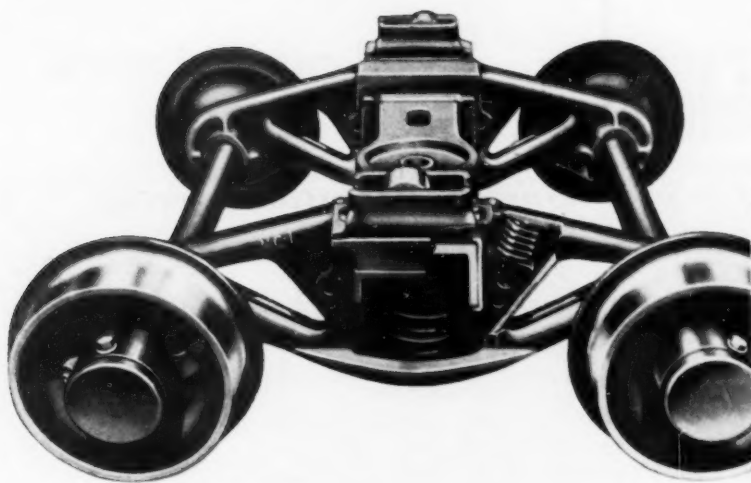
Norblo

Engineered Dust Collection Systems for All Industries

THE NORTHERN BLOWER COMPANY

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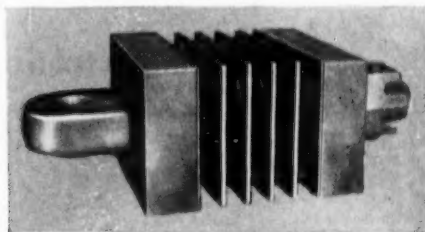
MINING WORLD, November, 1951. Volume 13 No. 12. Published monthly, except April when publication is semi-monthly, at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North, Central and South America, \$3.00 per year; other countries, \$4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 71 Columbia St., Seattle 4, Washington.



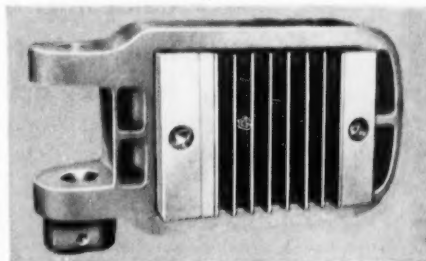
The NC-1 Truck climaxes 20 years of intensive research, providing (through the friction control mechanism shown in cut-away) protection to equipment, roadbed and lading with maximum wear life.



Willison Automatic Couplers save time with maximum safety . . . can be coupled at either end of car or locomotive . . . require no manual assistance. Close coupling eliminates damaging slack, permits high speeds with maximum stability.



National M-230 Rubber-Cushioned Draft Gear for cars operating through rotary dump. Soft initial-action, high-capacity rubber pads provide maximum impact protection, lengthen equipment life. Available in a range of capacities and design variations to fit individual requirements.



M-225 Rubber-Cushioned Draft Gear for locomotives and large capacity cars not required to operate through rotary dump. Maximum protection in minimum space.

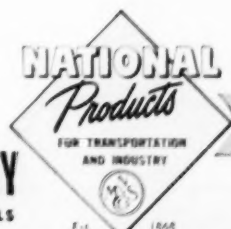
A-1003

NATIONAL *products cut per ton costs!*

Latest example of National's pioneering in better equipment is the NC-1 Truck. Its sweeping advancements over conventional trucks include long soft springs, a friction mechanism—controlling vertical and transverse oscillations, a cast one-piece holster with large lubricated center connection, and automatic frame alignment. The NC-1 has been designed with the same factor of safety that is required by the Association of American Railroads for full size railroad trucks, and embodies the same features which A.A.R. tests have shown to be essential to produce good riding qualities. For the best in profitable equipment, *always specify National products.*

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

WILLISON AUTOMATIC COUPLERS • NC-1 TRUCKS • DRAFT GEARS • NACO STEEL WHEELS



Dorrco Worldwide

*a network of engineering organization serving
the mining industry in every corner of the globe...*

Throughout the mining areas of the world, Dorr equipment and engineering are available through Associated Companies and Representatives, with facilities for local manufacture.

IN EUROPE: Dorr-Oliver Companies in England, Belgium, Netherlands, France, Germany and Italy.

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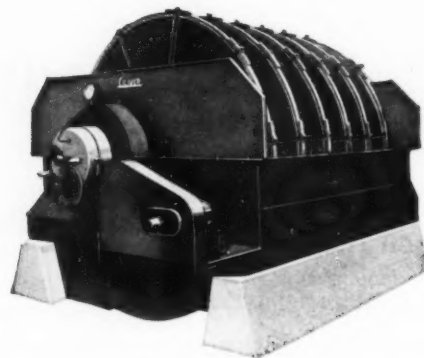
IN SOUTH AMERICA: Fiore Company in Buenos Aires; Serva Ribeiro in Rio de Janeiro and Sao Paulo; John Lindsay in Caracas; and conveniently located Dorr Resident Engineers.

disc filtration at its best...

the **AMERICAN CONTINUOUS FILTER**

provides...

- maximum filter surface per square foot of floor area.
- quick filter cloth replacement.
- handling of different feeds by a single unit.



OLIVER UNITED FILTERS are available through Associated Companies and Representatives of the Dorr Company throughout the mining areas of the world except North America, South Africa, Australia and the Philippines, where they are obtainable through OUF's direct representation.

BETTER TOOLS *today* TO MEET TOMORROW'S DEMAND



D O R R

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THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
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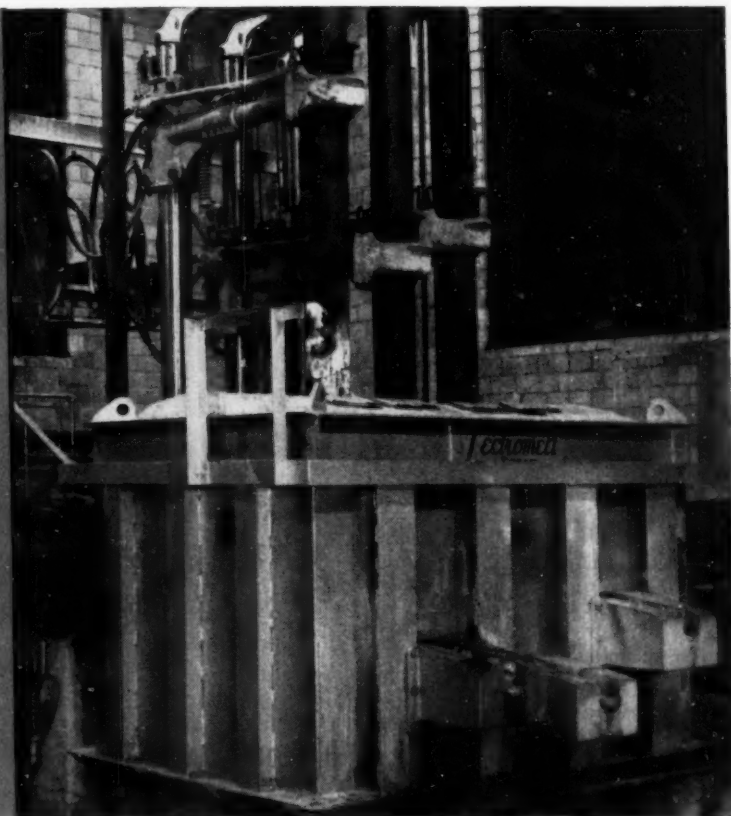
between laboratory batch



and production run . . .



**a LECTROMELT
pilot plant
furnace
can save you
Time, Money**



Ores and concentrates to be treated vary considerably. Before trying to design a production setup based on theory and small-scale lab tests alone, prove the process with a Lectromelt Pilot Plant Furnace.

Lectromelt engineers can help you with that pilot operation, calling on their wealth of electric furnace know-how. The furnace they recommend will be versatile—substation equipment will provide a wide range of secondary voltages; varying electrode spacing and refractory conditions can be provided for. Conditions resulting from the hot and cold sensitivity of practically any material can be met, enabling

you to make test runs on a wide variety of changes.

After you prove your process, Lectromelt engineers will then work with you to design your production unit. Lectromelt field engineers' services are customarily provided when a Lectromelt furnace is purchased.



Write for your free copy of our catalog, "Moore Rapid Lectromelt Furnaces for Smelting and Refining Operations." Pittsburgh Lectromelt Furnace Corporation, 324 32nd Street, Pittsburgh 30, Pa.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . SWEDEN: Birlec, Elektkougnaar A/B, Stockholm . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

REG. T. M. U. S. PAT. OFF.

WHEN YOU MELT...

MOORE RAPID
Lectromelt



NOVEMBER, 1951

[World Mining Section—5]

NO GUESSWORK HERE!

Experienced mill operators know that when you select **WEMCO S-H Classifiers** your judgment is backed by six proven design features.

1

SHARPER SEPARATION

maximum settling difference between fine and coarse particles is gained by larger **effective** pool and control of pool agitation.

2

SIMPLE HYDRAULIC LIFTING DEVICE

provides simple, fool-proof operation and gives complete protection against clogging or jamming.

3

GREATER SAND RAKING CAPACITY

up to 100% increase as compared to other type classifiers is provided by **WEMCO S-H (Special Helix)** design.

4

STURDY SHAFT AND FLIGHT ARMS

tubular shaft is up to 50% larger than other machines of the same capacity; flight arms are shorter and stronger.

5

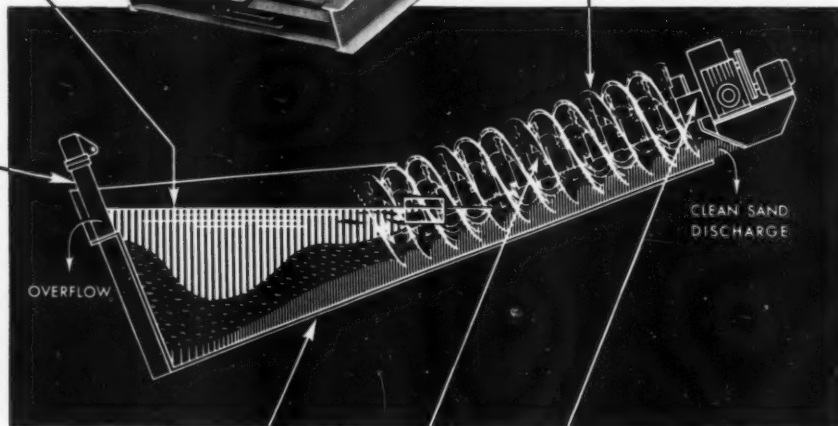
FULLY PROTECTED BEARINGS

with efficient gear drive assure dependable, continuous operation at lower horsepower.

6

LOWER WEARING SHOE REPLACEMENT COSTS

special **WEMCO** spiral design permits 25% reduction in lineal length of spiral, hence replacement costs of wearing shoes per ton of ore milled are 25% less.



At least **one** of these reasons probably fits **your** requirements.

One is enough to warrant your consideration of **WEMCO S-H Classifiers**.

Write today for full particulars on these **modern** machines

OTHER WEMCO PRODUCTS

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Densifiers
Cone Separators • Drum Separators • Fagergren & Steffensen Flotation
Machines • Fagergren Laboratory Units • Hydroseparators • HMS Labora-
tory Units • Dewatering Spirals • Agitators • S-H Classifiers • Thickeners
Sand Pumps • Conditioners

WEMCO

WESTERN MACHINERY COMPANY

760, 766 FOLSOM STREET • SAN FRANCISCO 7, CALIFORNIA

HARD to understand but EASY to appreciate

Most people have to see the Pacific RTC at work to understand quickly *how* it operates. The secret is in the patented sheave with its sprocket-like bottom flange. Connecting chains drop down between sprocket teeth to pass unit. Main inhaul and backhaul cables remain engaged at all times. U.S.A. ★ FOREIGN PATENTS APPLIED FOR.

Everyone easily appreciates the advantages of RTC. Helps you make more money by getting out more ore. *Eliminates* double-slushing. Reduces setup time. Reduces costs. Thoroughly field-tested. Light, portable, easily installed in timbered or hard rock operations. Write for complete information.

SLUSHING

Model illustrated operates with double-drum hoists up to 20 H.P. For best results use Pacific "Slushmaster" or Pacific Drag Scrapers up to 42 inches in width.

**ALLOY
STEEL &
METALS
CO.**

INHAUL

1862 E. 55th St., Los Angeles 58, California
Mailing Address: Box 15323 Vernon Station, Los Angeles 58, Calif.

BE SPECIFIC — ORDER PACIFIC — Jaw Crushers, "Slushmaster" Scrapers, Sheave Blocks, Sheave Anchors, Bit Knockers and Pacific Wearing Parts.

NOVEMBER, 1951

[World Mining Section—7]

7

You get * **DOUBLE DUTY**



JOY TELESCOPIC FEED STOPERS

The S-91T provides a steel change of 36", compared with the 18" change of conventional stoppers. In most mining conditions, this long feed will give more drilling time, with fewer steel changes and fewer lengths to stock.



At left, the Joy S-91T Stoper in operation; above, with telescopic feed leg retracted; right, with leg extended, giving a 36" drilling feed. Another feature, instant "thumb-flip" rotation release, provides safety and easy spotting of holes.

JOY HAND-HELD DRILLS

A complete line of well-balanced, compact drills, ranging from 27 to 67 lbs. in weight.



The L-57 and L-67 Joy Hand-Held Drills are also available with mounting brackets for use as light drifters, or for wagon drill mounting.

JOY HYDRO DRILL JIB

Air-hydraulic control of all jib movements eliminates heavy lifting, and permits more accurate hole spotting for more efficient use of powder and controlled breakage.



Joy Jibs are hydraulically controlled booms for drill mounting on Jumbos, or on rubber-tired, self-propelled Drillmobiles.

1851—1951—100 YEARS OF ENGINEERING LEADERSHIP

with **JOY** **DUAL-VALVE** **SILVER STREAK DRILLS**

**Maximum Footage—Maximum Economy*

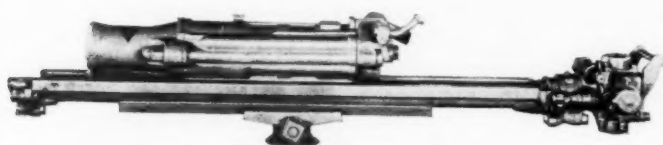
In tunnels, crosscuts, drifts, or stopes, Joy Silver Streak Rock Drills with the DUAL VALVE will do your drilling job faster, and use less air with lower maintenance. Here's why—

(1) The exclusive DUAL VALVE, a feature of all Joy rock drills, makes air do more work. By admitting the correct amount of air behind the piston and excluding air ahead of it during the drilling stroke, maximum force is exerted on the drill steel. There's no cushion of air ahead of the piston to reduce the force of the blow. Then the rear section of the Dual Valve meters the correct amount of air ahead of the piston to force it back with a "snappy" rotating action. This adds up to more power-packed strokes per minute, for faster drilling with less air.

(2) The silver-like cadmium plating on Joy Silver Streak Rock Drills aids lubrication while running-in, protects parts from rust while in stock, and keeps maintenance costs at a minimum.

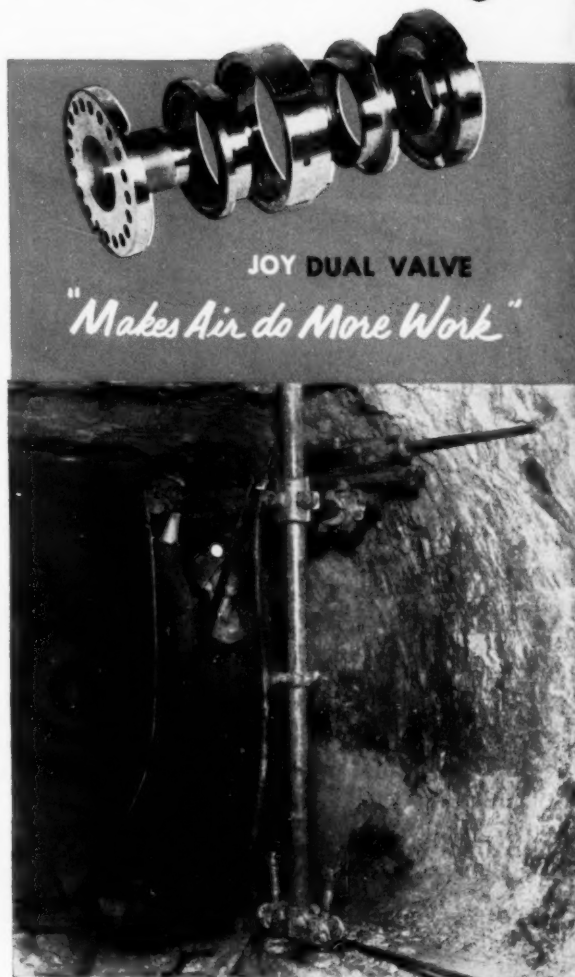
The Joy line is complete. There's a Silver Streak rock drill for every rock breaking need. Shown here are drifters, stopers, hand-held drills, Hydro Drill Jibs. To complete the line, there are wagon drills; the QB-20 for line drilling and dimension stone quarries; rubber-tired, self-propelled Drillmobiles; and specially mounted drills for special needs.

• Let our Field Men work with you.



JOY DRIFTERS

For column mounting, as at right, or for use on mobile jumbo units, Joy Drifters are built in three sizes—all with fast, powerful Dual Valve action. Efficient Pistonmotor Feed, with only two moving parts, provides strong, steady advancement and retraction. One-piece locking chuck increases bearing area and reduces wear on lock ring and chuck bushing.



Consult a Joy Engineer



JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



Gold bearing froth on one of the forty No. 24 Denver "Sub-A" Flotation Cells at MacLeod-Cockshutt Gold Mines, Ltd., Geraldton, Ontario, Canada.

OVER 90% of all FLOTATION PLANTS IN CANADA USE DENVER "SUB-A"

Here's Another Reason Why...

93% RECOVERY OF GOLD IS BY DENVER "SUB-A" FLOTATION

PROBLEM: At MacLeod-Cockshutt Gold Mines, Ltd., Geraldton, Ontario, gold is intimately associated with sulphides—either in microscopic form or in solid solution. Extreme fine grinding of sulphides will not liberate gold to permit maximum economic recovery.

SOLUTION: Denver "Sub-A" Flotation concentrates refractory sulphides. (About 93% of the gold is contained in 23% by weight of concentrates.)

Concentration of refractory sulphides permits preferential treatment (by roasting) which would not be economically possible if directed at whole tonnage milled.

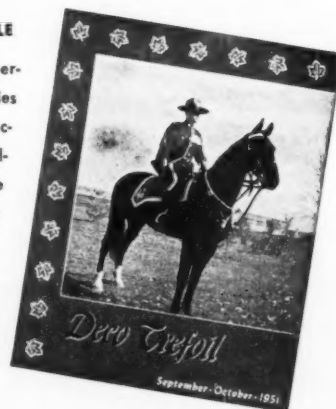
PROOF of the fact that Denver "Sub-A" Flotation will help your mineral recovery is the thousands and thousands of Denver "Sub-A" installations all over the world and the many operations now changing to Denver "Sub-A" Flotation.

Denver "Sub-A's" are Standard Flotation machines — flexible to meet flowsheet changes and special problems of your ore.

Write today. Prices and summary of additional advantages will show how you, too, will profit more with Denver "Sub-A" Flotation.

PUBLICATION AVAILABLE

DECO TREFOIL (September-October issue 1951) carries the complete story of MacLeod-Cockshutt gold milling. Your copy will be sent on request. Please indicate your connection with the mining industry.





FLOTATION ENGINEER

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"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY

1400 SEVENTEENTH STREET • DENVER 17, COLORADO



C-5110

"CAT" BULLDOZER...

America's
all-purpose
tool!

THESE "Caterpillar" D7 Tractors with matching No. 7S blades are 'dozing molybdenum in a mine near Climax, Colorado. Their tough 'dozers take a constant beating from rocky abrasives; but their record has made owner Robert Ryan of Lakewood, Colorado, one of the best "Caterpillar" boosters in the Rockies.

These machines give you blade and tractor *built* to work together. This rugged team is a bear at meeting work schedules. Sturdy construction and quality materials enable it to keep punching full time without time out for tinkering, and the special steel cutting edge of the blade hammers through the toughest going. Most important of all, the precision methods used in "Caterpillar" factories build extra years of life into these highly maneuverable bulldozers.

For help with your equipment problems, see your "Caterpillar" dealer *now*. Today's expanding military program has high priority. But it is recognized that our national preparedness depends upon stepped-up civilian production too. So your "Caterpillar" dealer is

Working at a molybdenum mine near Climax, Colorado, which produces most of the world's molybdenum, these "Cat" D7s with No. 7S 'Dozers are feeding ore into hole leading to mine tunnel. They also operate dragline in the mine tunnel. Their ability to slug into a job and finish it on schedule is particularly important here, for molybdenum is used to strengthen steel and to produce alloys important to national defense.



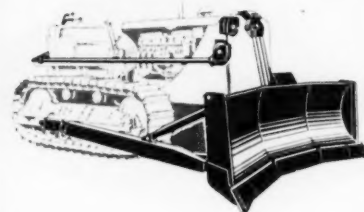
especially interested in meeting your needs—through equipment replacement and by exercising his working partnership with you to keep the machinery you have *on the job*.

CATERPILLAR, SAN LEANDRO, CALIF.; PEORIA, ILL.

. . .

"CATERPILLAR" BULLDOZER EXTRA FEATURES

- 1 Tractor and 'dozer broken to harness, and a size for every need.
- 2 Moldboard curvature for active, rolling, higher production loads.
- 3 Box section side arms—extra thick at points of greatest stress.
- 4 Choice of straight or angling type of blade, simple to maneuver and easy to adjust or detach.
- 5 Your choice of hydraulic or cable controls.
- 6 The power of the "Caterpillar" Diesel Engine is geared to blade capacity.



New Addition to 'Dozer Line

Here's a specialist that can step up production and cut costs. It's the brand new No. 8U 'Dozer for use with the "Caterpillar" D8 Tractor with cable control. Working best in loose or light material, the end portions of the blade extend forward, giving it a flat U-shape. This enables it to drift large loads without spillage, making it possible to bulldoze longer distances for bigger production. The No. 8U is built to the same high standards of strength and long life as the other "Caterpillar" Bulldozers. The versatility of this new tool gives it excellent performance on all kinds of 'dozing jobs, from stockpiling to pioneering.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

Cut Cooling Costs

These 3 Ways

1. CUTS INSTALLATION COSTS

The air-quenching grate cooler comes as a complete unit, fits into existing plants readily because it operates horizontally. Installation costs are 10 to 30 percent less than the cost of installing any other type of cooler! Kiln piers need not be elevated . . . no pit is required beneath kiln.

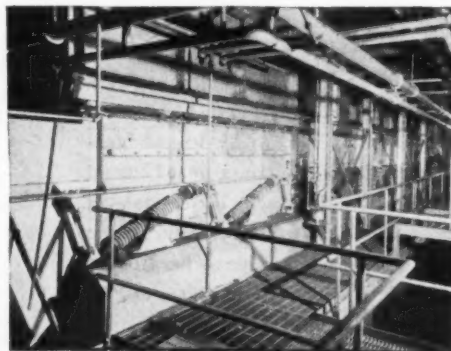
2. CUTS MAINTENANCE COSTS

Reciprocating motion of grate is carried on flexible rubber bushings and springs. No wearing parts and no slippage. Material does not slide on grate, it hops, gently and steadily. Lubrication is negligible, only four grease fittings on entire cooler. Maintenance cost runs as low as $\frac{1}{10}$ cent per barrel.

3. CUTS ROTARY KILN FUEL COSTS

Air-Quenching grate cooler actually returns 75% of sensible heat in material back to kiln as secondary combustion air. Material is cooled quickly, to a temperature where handling is no problem, by means of cooling air coming up through the relatively thin bed of hot material on grate.

4½ by 70 ft Allis-Chalmers air-quenching grate cooler installed in processing plant where it cools large quantities of material from 2500° F to approximately 150° F.



Handles Fine or Coarse Materials

Both fine and coarse materials can be cooled equally well. Need for a supplementary conveyor under cooler is eliminated. Pan conveyor can be added on cooler without need for an additional drive. Get more facts from the Allis-Chalmers representative in your area, or write for Bulletin 07B6368A. Allis-Chalmers, Milwaukee 1, Wisconsin.

Pulverator is an Allis-Chalmers trademark.

ALLIS-CHALMERS



A-3470

Sales Offices in
Principal Cities in
the U. S. A. Distributors
Throughout the World.



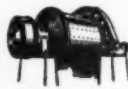
Pulverators



Vibrating Screens



Jaw Crushers



Grinding Mills



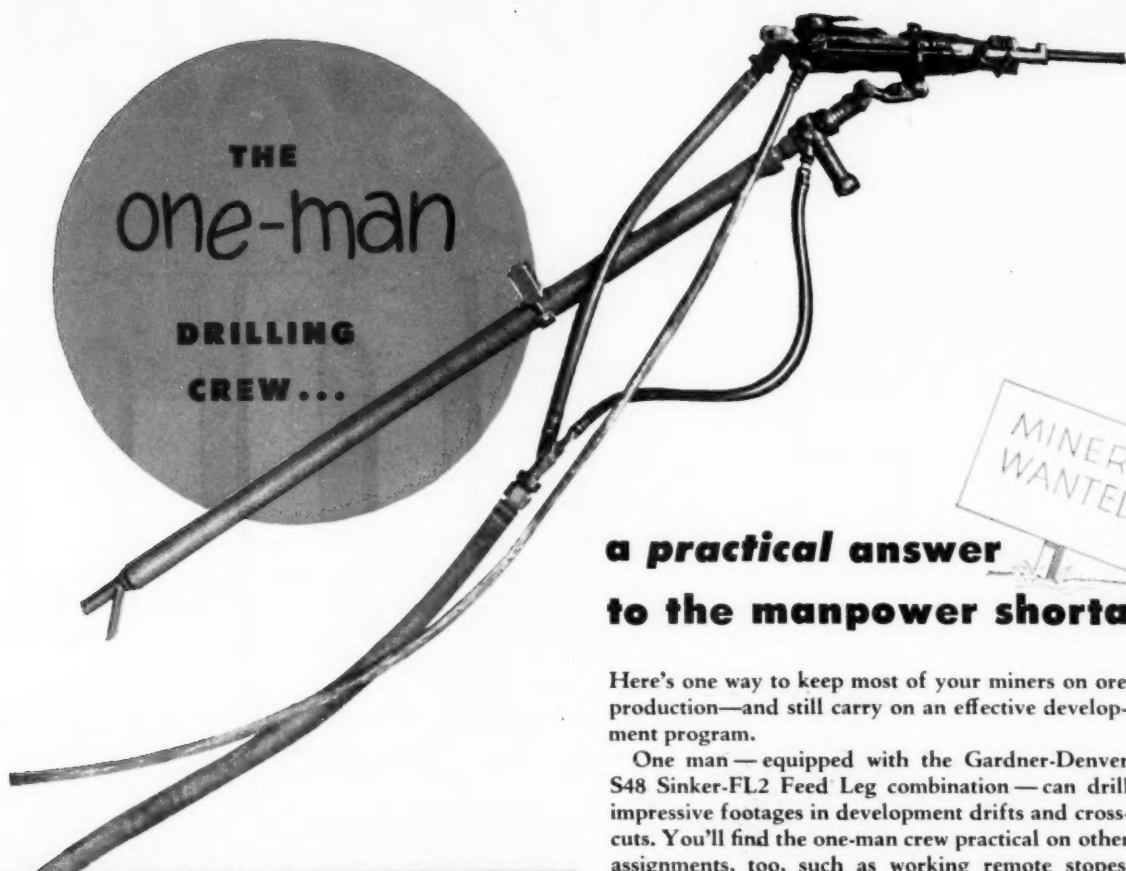
Gyratory Crushers



Kilns, Coolers, Dryers

THE
one-man

DRILLING
CREW...



MINERS
WANTED

a practical answer to the manpower shortage

Here's one way to keep most of your miners on ore production—and still carry on an effective development program.

One man—equipped with the Gardner-Denver S48 Sinker-FL2 Feed Leg combination—can drill impressive footages in development drifts and cross-cuts. You'll find the one-man crew practical on other assignments, too, such as working remote stopes, secondary breaking at draw points, eye-bolt drilling, etc.

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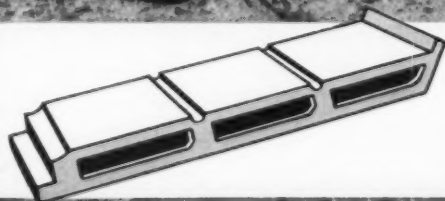
TOURNAROCKER

design...



Dump is fast and safe. With power on front wheels, Tournarocker backs to edge of spill, sets rear-wheel brakes, dumps big load quickly, and moves off for another load.

Tournarocker—Trademark P819



Tournarocker body is all steel . . . the front $\frac{3}{4}$ ", the sides $\frac{1}{2}$ " plate. Bottom consists of $\frac{1}{2}$ " plate with $1\frac{1}{2}$ " billets welded on top at 8" intervals . . . with billets covered by $\frac{3}{4}$ " heat-treated tool-steel strips 8" wide (as shown in cut-away section at left).

To reach this job in the Tehachapi Mountains, the 2 rear-dump Tournarockers were driven 125 miles up heavily-traveled U.S. 6 from Los Angeles. Travel speeds reached 35 m.p.h.



Big 8' x 12 1/2' top opening, plus low rear entry, speed loading of heavy limestone rock. Reinforced all-steel body eliminates a lot of loading shock damage and maintenance troubles.



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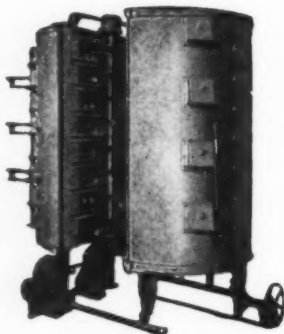


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FULLERS EARTH	MAGNESIUM
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PYRITE	ANTIMONY

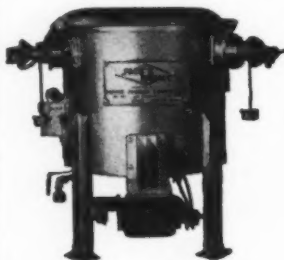
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GRAB SAMPLES From the Mail

Regularly Helpful

Dear Sir:

I receive *World Mining* regularly and find a considerable use for it. It is both interesting and helpful.

Raymond Brooks
Managing Director
Rhodesia Copper Ventures Ltd.
Sinoia, Southern Rhodesia
Africa.

Views of a Constant Reader

Dear Sir:

I receive *World Mining* regularly. As a constant reader for several years may I congratulate you for the splendid service you are doing for the mining men all over the world.

Saim Yurdakos
Chief Production Engineer
E. K. I. Uzulmez Bolgesi
Zonguldak, Turkey

Helpful Reading in Mexico

Dear Sir:

I am a subscriber to the *Mining World* and find it quite helpful and enjoy reading it.

George Stosius
Mine and Mill Superintendent
Cia Minera El Trigo
Mineral El Trigo
Yecora (via Sahuaripa), Sonora
Mexico.

Very Interesting Publication

Dear Sir:

We receive your publication *Mining World* regularly and find it very interesting.

D. R. Mew
Superintendent, Perak District
Southern Kinta Consolidated Ltd.
(Anglo-Oriental, Malaya, Ltd.)
General Managers
Malim Nawar, Perak
Federation of Malaya.

Wabakeep and O'okiep and Narvik

Dear Sir:

It is a continual pleasure to read *World Mining* for its well balanced digest of International activities in the mining field. May I draw your attention to an error that has appeared more than once in various American publications including *World Mining*, viz. the copper and tungsten mines operated by the O'okiep Company in Namaqualand are in the Cape Province, Union of South Africa, and not in South West Africa. The distance between Wabakeep and Tsumeb is about 800 miles.

G. Sohnger
Tsumeb Corporation, Ltd.
P. O. Tsumeb
South West Africa.

Dear Sir:

In your columns Narvik has been mentioned as a Swedish town. Narvik is a Norwegian tide water port and town to which a substantial part of the iron ore of northern Sweden is hauled by rail for shipment overseas.

L. A. Conradi
Research Engineer
Norwegian Institute of Technology
Trondheim, Norway.

Thanks for calling attention to these errors. It is a difficult job to accurately locate every mine in the world. *Mining World* is continually striving for complete accuracy. Only yesterday did we learn that Mbarara was in Uganda, Central Africa, and that Hants was in Nova Scotia.—Ed.

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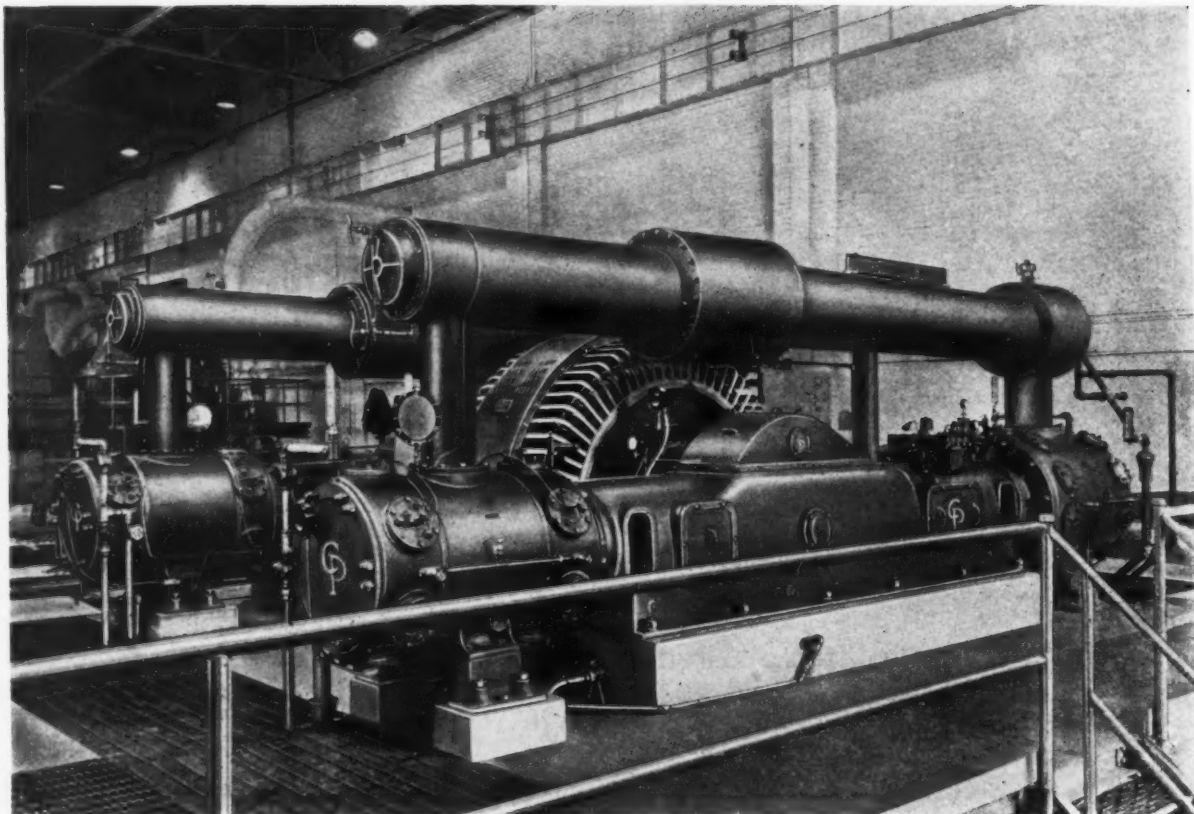
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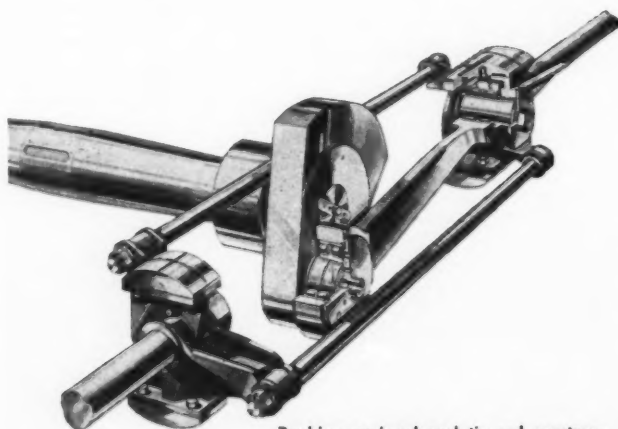
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NOVEMBER, 1951



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Write for Bulletin 726-C



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MINING WORLD

and the export edition
WORLD MINING

A Miller Freeman Publication

Published monthly except in April when publication is semi-monthly

NOVEMBER, 1951

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DRIFTS AND CROSSCUTS

Why Not Lithium Minerals??

One of the last constructive orders issued by the DMA shortly before its functions and authority were transferred to the new mineral-activity-centralizing Defense Materials Procurement Agency was the issuance of Mineral Order No. 5, As Amended. This, among other things, added bauxite and halloysite to the list of strategic and critical minerals. By this order the two became eligible for government aid under "the provisions of the Defense Production Act of 1950 with reference to the encouragement of exploration, development and mining of critical and strategic minerals and metals pursuant to section 303 (a) (2) of the act."

This action was, certainly, a constructive step and it is to be hoped that one of the first functions of DMPA will be to include the lithium minerals: Spodumene, (LiAlSi₃O₆); Lepidolite, (LiKAl₂F₂Si₃O₁₀); Amblygonite, (LiAlFPO₄); and dilithium sodium phosphate, (Li₂NaPO₄) to the critical and strategic list.

There is no question about the critical need for the rapid development of the Hydrogen bomb in view of Russia's second successful atomic explosion. The use of lithium metal in its construction has been widely publicized. Lithium compounds are used in a variety of other military defense items, including radio and other electronic tubes, optical lenses, and for lithium hydride which produces hydrogen for inflating life-raft radio-antennae balloons.

An Opportunity and a Challenge

Whoever the new director of the United States Bureau of Mines may be, he most certainly has a job cut out for him.

The Bureau and its "offspring," the DMA, have been the subject of much criticism from mining people all over the nation. Any government agency is, and should be, criticized by the taxpayers who support it. Many constructive ideas are voiced, while, at the same time, a large number of complaints will be heard, no matter what is done under any policy. Certainly the large number of complaints about the mining and metal situation, including those from high governmental personnel, should give the new director real cause for concern.

To obviate, or at least reduce, the causes for such complaints is a challenge for him. He will have the opportunity to strengthen the functions and services for which the Bureau is best-known and qualified to perform. They include mine safety, collection and publication of all kinds of mineral industry statistics and data, coal mine inspection and basic research for the mineral industry.

He will have an equal opportunity to take the Bureau "out of politics."

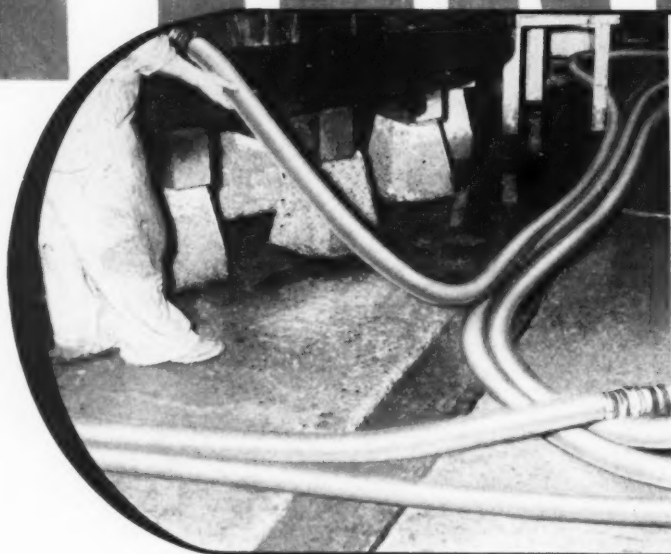
The Congress of the United States must originate and pass legislation if the nation is to remain strong and free. The Bureau and its employees should not testify for or against any legislation, or express opinions to Congressional committees, whether a law or proposed law is or could be good or bad. However, the Bureau and its staff should continue to be used to furnish statistical and other factual data.

More and more of the Bureau's work has been in connection with foreign mining. In fact, questions as to "whose Bureau of Mines" have been raised. The Bureau's activities should be controlled so that there is no question in any miner's mind but that it is the United States Bureau of Mines.

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Franzia Brothers Winery opened a plant at Ripon, California, shortly after the repeal of Prohibition—remember those days?

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A decade or so of service for these excellent Pioneer products is not too unusual; but, as Mr. Salvador J. Franzia says, "hose takes a real beating in a winery." It must withstand extreme and rapid changes in temperature, withstand alcohol, dragging around corners and across cement floors.

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CAPITOL CONCENTRATES

IMC RELAXES GOLD SALE BAN FOR NON-MONETARY PURPOSES

Gold miners have been anxiously watching the reports from the International Monetary Conference. The reluctant relaxation of the ban on the sale of gold for non-monetary purposes at prices higher than \$35.00 an ounce has left to each of the 50 member nations how much of gold holdings and production will be permitted for sale at premium prices.

As far as the United States is concerned, it will be up to the Treasury Department whether or not gold mines in the U.S. will be able to participate in sales in the world's premium markets. But in view of the opposition of the U.S. government to higher prices for gold, American miners of the precious metal doubt they will get permission to export gold or sell it at premium prices outside the U.S. The government now requires all refined gold in the U.S. to be sold to the Treasury at \$35.00 an ounce.

The only way a mine in the U.S. can get a higher price is to sell the metal in the unrefined and natural state to buyers in the U.S. There have been a number of such sales on the speculation that some day the U.S. price may be lifted. Meanwhile influential groups and associations are holding meetings in Washington to map a plan of action for domestic gold producers.

● Tungsten Report Requested

The fact that the government's tungsten program is a flop as far as small mines are concerned has been admitted by DMA Acting Administrator Schroeder, and the Lyndon Johnson Preparedness Subcommittee of the Senate has requested DMA to prepare a report on the situation. Independent surveys made in various states show that a \$65.00 price for concentrates which meet GSA specifications, when translated into returns to the miner, is entirely inadequate.

● Secrecy Order Should Be Watched

The recent order of the President extending secrecy classifications to civilian agencies will give further impetus to the bureaucratic instinct to protect itself from its own mistakes. A vast amount of information was held from the public during World War II under restricted classifications where there was no security reason for secrecy whatsoever. Sometimes it pleased a bureaucrat to be mysterious. Sometimes his life was made easier because it dried up inquiries which otherwise would have had to be answered. Often it prevented his errors from becoming public. Many times material was classified as restricted which actually could be procured from publications, private and of other government agencies. Unless carefully watched such a situation can become, not only absurd, but downright dangerous.

● Absurd Precautions Being Taken

The various investigations of the RFC have scared Administrator Symington so badly that anyone calling at the building must go to a special room, register and give his life history and, probably, his fingerprints, be-

fore he is eligible to talk to an employee about a case. As to a phone call, they act as though the caller were a White Russian phoning the Kremlin with the OGPU on the line at all times. The whole affair has degenerated to the point of absurdity.

● Contract Merely Guarantees Price Floor

It is interesting to note that the guaranteed contracts which are being made with big copper producers by the Defense Materials Procurement Agency are well below the present market prices. In fact, the contracts merely guarantee a floor price for a specified number of tons. The contract with Phelps Dodge Copper Company, for instance, calls for a floor price of 22 cents per pound, yet the corporation will spend over \$25,000,000 to expand production by some 38,000 tons per year. Phelps Dodge has the privilege of selling all its copper on the open market as long as the price exceeds 22 cents, but when the price drops below that point, DMPA will take up to 112,500 tons of the first 150,000 tons produced at the floor price, or such part thereof as has not been sold to other purchasers, thus bailing out the investment.

● Justify Foreign Mine Expenditures

Mineral planners in Washington are attempting, by some roundabout reasoning, to justify their huge commitments for development and putting into operation mines in foreign countries. They frankly admit that not all the increased foreign output at which they are shooting will come to this country. In some cases, they say, the bulk may go elsewhere. But that prospect doesn't bother them. They explain their attitude by citing the case of the ECA deal in French Morocco. Most of the lead and zinc will go to France. As a result, the reasoning goes, France will buy less lead and zinc from the Western Hemisphere, leaving more of this near-at-home supply for the U.S.

Now you know the answer—or do you? One-tenth the amount spent in the United States would bring out production in this country—and for this country.

● Contract Formula Is Adopted

DMPA has decided to adopt the technique formerly used by the Metals Reserve Company for quick financing of mining expansion, and has already approved one such case. The method, which is simple and effective, is to write a contract for the product, earmark part of the purchase price for repayment of a cash advance against future delivery and take delivery of enough metal under the contract to repay the advance.

● Price Ceilings Raised on Lead and Zinc

Here they go again monkeying with the price spiral on metals. Ostensibly to increase imports, the ceiling on imported lead has been raised to 19.5 cents per pound and on imported zinc to 19.0 cents per pound. Another order raised domestic price ceilings on lead and zinc by a like amount. The pretext for this new breach of the stabilization program is to increase imports. As with the previous lifting of ceilings on other metals, this is an obvious fallacy. Other economies have to have metal

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and they will just raise their prices accordingly. The raise in domestic ceilings will cost the war program countless millions of dollars, and there will be a rash of applications to OPS to adjust secondary lead prices, and to raise the prices of manufactured goods so that the consumer also will pay through the nose. We went all through this during World War II and Leon Henderson and Jesse Jones, being smarter than the present top-level bureaucratic layer, came up with the Premium Price Plan.

• May Substitute Aluminum For Copper

In addressing the annual meeting of the National Association of Food Chains in Washington, Eric Johnston, economic stabilization administrator, said that it may be necessary to substitute aluminum for copper in-as-much as 60 percent of the goods produced for the defense effort.

The aluminum industry is being expanded tremendously at government expense. One may wonder what copper is going to do for a market when the defense effort is over and we have a huge aluminum industry, in debt only to the government, which will be seeking markets for its output. It is largely because of this situation that many copper companies, before making huge capital investments for opening new mines, are asking for a floor on prices over a period of years.

• Quicksilver Price Is Up

The result of taking price ceilings from a number of what Eric Johnston, economic stabilizer, termed "minor metals and minerals," is becoming evident in the quicksilver market. The price per flask hit \$221.00 on October 5. This means that the consumer, principally Uncle Sam, no doubt, will pay through the nose in increased prices for finished goods containing this metal.

The Metals Reserve Company's scheme of paying producers a substantial bonus over a reasonable ceiling price was much more sensible and better for a war economy in every way. In a peacetime economy free markets should prevail. The fact is, that a war time or defense emergency economy requires price ceilings and still necessitates prices to the producer which will induce increased production. Johnston also included manganese and chrome among the "minor metals and minerals." Someone should tell him the facts of our steel economy.

• New Sources Of Copper Sought

Having contracted for all the copper production in sight at the ceiling price, the government at last is surveying applications for expansion which entail over-market prices.

COMING CONVENTIONS

November 15 through 17, 1951. INTERNATIONAL MINING DAYS, El Paso, Texas.

November 30 and 31, 1951. 57th Annual Convention NORTHWEST MINING ASSOCIATION, Davenport Hotel, Spokane, Washington.

January 17 through 19, 1952. Annual Convention NEW MEXICO MINERS & PROSPECTORS ASSOCIATION, Carlsbad, New Mexico.

January 31, February 1 and 2, 1952. Domestic Mining Convention in conjunction with the Annual Convention of the COLORADO MINING ASSOCIATION, Shirley Savoy Hotel, Denver, Colorado.

WORLD MINING

The International Department of MINING WORLD

INTERNATIONAL PANORAMA

KUALA LUMPUR—The Federated Malay States Chamber of Mines and the All-Malaya Chinese Mining Association have asked the Malayan Federal Government to invite the U. S. Government to send experts to Malaya to determine facts about tin production and marketing.

ODENDAALSRUST, ORANGE FREE STATE—The Welkom Gold Mining Company, Ltd. has started its gold mill to determine the metallurgical characteristics of the ore and to test the equipment. Development ore from drifts being driven from the company's two shafts is being milled.

MELBOURNE—Nine tin mining companies: Tongkah Compound NL; Tongkah Compounds Nos. 2, 3, 4, and 5; Kuala Lumpur Tin; Satupola NL; Tinsongkhla NL; and Ronpibon Tin NL have applied for Capital Issues consent to merge and form one company.

SUDBURY, ONTARIO—The International Nickel Company of Canada, Ltd. has completed its new No. 7 shaft and 10,000 ton per day concentrator at its Creighton mine.

AMSTERDAM—The Ymuiden Blast Furnaces & Steel Company is expanding plant facilities to increase annual steel output from 300,000 to 570,000 tons.

TAMPICO, MEXICO—The Mexican government-administered National Railways is to build a new ore shipping wharf here. It will accommodate both railroad and truck deliveries.

EAST ST. LOUIS—The domestic price for Prime Western zinc has been increased two cents to 19.50 cents per pound. An import price ceiling of 19.50 cents has also been established for imported zinc.

HENDERSON, NEVADA—Combined Metals Reduction Company will build a ferro-manganese plant here at an estimated cost of \$1,250,000. Manganese concentrate from the company's Pioche, Nevada mines will be furnished.

WASHINGTON—The International Monetary Fund has relaxed its ban on the sale of gold for non-monetary purposes at prices greater than \$35.00 per ounce. The 50 IMF nations will determine how much of their output and/or reserves can be so sold.

NEW YORK—The domestic price for lead has been raised two cents to 19.00 cents per pound. An import price ceiling of 19.00 cents has also been established for imported lead.

WASHINGTON—The National Production Authority has directed that 6,000 to 7,000 tons of pig lead under delivery contract to the national stockpile for the last four months of 1951 be diverted to industry uses.

PRETORIA—A new compact precision instrument has been developed for counting gamma rays emanating from uranium. It is designed for use in diamond drill holes 1 1/4-inches in diameter and up to 10,000 feet deep. It is constructed to withstand water pressures as high as 5,000 pounds per square inch.

PORT ELIZABETH, UNION OF SOUTH AFRICA—The South African Steel Industrial Corporation, Ltd. will increase its annual steel production facilities from 600,000 to 1,000,000 tons by the first of 1952.

PITTSBURGH—Production of steel in the United States during the first nine months of 1951 was at an all time high—78,328,742 tons. This is an increase of 6,624,057 tons over the same 1950 period.

PITTSBURGH—The Jones & Laughlin Steel Corporation produced its greatest tonnage of pig iron in a month's time during August. In addition to the pig iron production record a total of 49 other production records were established during the month.

WASHINGTON—Six reopened government-owned magnesium plants are back in production and accounted for a large part of the increase production during the first seven months of 1951. The plants are in Canaan, Connecticut; Velasco, Texas; Manteca, California; Painsville, Ohio; Spokane, Washington and Wingdale, New York.

NEW YORK—Imports of zinc into the United States during the first seven months of 1951 were 54,919 tons compared to 95,092 tons in the same 1950 period. Lead imports for the same period were also down—91,990 tons versus 238,440.

SANTIAGO—Exports of copper in August were 28,673 metric tons. Because of strikes the July exports were only 19,363 tons.

BABBITT BAY, MINNESOTA—The Reserve Mining Company has awarded a contract for construction of a commercial size taconite plant here. The plant will treat 7,500,000 tons per year and is scheduled for initial operation in 1956.

WASHINGTON—The Defense Materials Procurement Agency has signed its first contracts for metal purchases. Two contracts call for copper purchases from the Copper Cities Mining Company in Arizona and the North Butte Mining Company in Montana. The first zinc contract was with the Volcan Mines Company in Peru.

PARIS—Steel production in Europe during the first six months of 1951 was 10 percent greater than during the same 1950 period. The 1951 production was at an annual rate of 59,682,000 tons.

SOREL, QUEBEC—The first shipment, 3,000 tons, of titanium rich slag has been made from Kennecott Copper Corporation's new electric-smelting ilmenite plant.

NOVEMBER, 1951

[World Mining Section—17]

Commonwealth Countries To Get Machinery

The main decision taken at the recent meetings of British Commonwealth Ministers in London to discuss the supplies of raw materials was not announced or even hinted at in the communique or during a press conference. The decision was to expedite, by every means possible, the supply of capital equipment, especially mining machinery, to the Commonwealth countries. This will even take precedence, though unofficially, over dollar exports and contracts already signed.

Commonwealth mines, especially those producing copper, silver-lead-zinc, and manganese are likely to get their machinery well in advance of hitherto promised delivery dates.

This decision, taken by Britain's Lord Privy Seal and Minister of Materials, Richard Stokes, was a triumph for Commonwealth mining interests who had hammered home the point that without machinery there would be no increases in production. Giving this priority to Commonwealth producers while attempting to maintain dollar exports and Britain's heavy rearmament program will provide the Board of Trade with some difficult administrative problems during the next three months. However, assurances have been given that within 12 months most of the requirements for machinery will either be allocated or have been met.

DMPA Signs Contract With Peru For Zinc

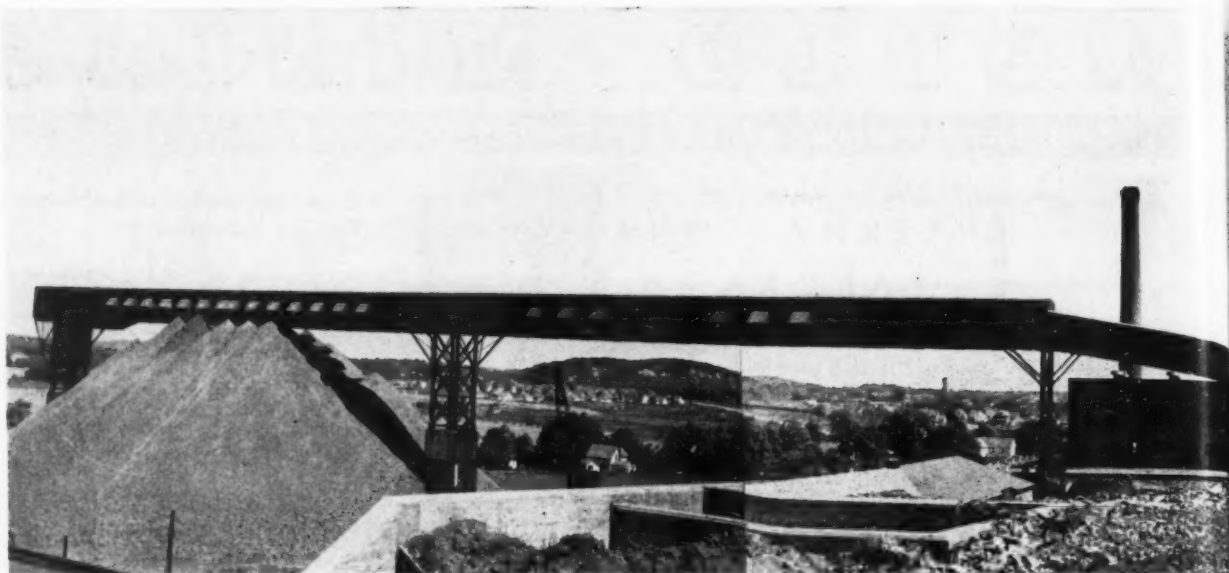
The new United States Defense Materials Procurement Agency has signed a purchase agreement with a Peruvian mining company to stimulate output of copper and zinc for U.S. industry.

In a contract with the Volcan Mines Company of Lima, Peru, DMPA will buy half of the slab zinc produced by the company, up to 380 tons a month, or a total of 13,680 tons over the next three years. The government will pay 17 1/2 cents a pound, f.o.b. smelter.

The company, in turn, will build a \$750,000 concentrating mill with a monthly capacity of 1,500 tons of 60 percent slab zinc at its mine near Tielio, Peru. The mill should be completed by January 1, 1953. All of the mine's output will be shipped to U.S. smelters where it will be processed into about 765 tons of slab zinc per month.

Bolivian Output Affected By Unstable Tin Price

Tin mining in Bolivia has been seriously affected by the unstable price of tin and efforts of the United States to maintain a low tin price. The price of tin has never been very stable, but now, with a rising feeling that a free market price is being suppressed, many Bolivian mine operators are becoming discouraged. Various small mines are reported to be reducing their tin ore production, and there is a general tendency toward turning to the mining of tungsten, lead, and antimony.



Enclosed conveyor-belt stockpiling system at the Mather "B" shaft at Negaunee, Michigan. The stockpile is being built up with iron ore discharged through the hooded ports. The head pulley, belt tightener and one of the 180° flipping rolls are located in the vertical section of the gallery at the extreme left of the picture.

CLEVELAND-CLIFFS' MATHER "B" MINE USES FLIPPING CONVEYOR BELT FOR STOCKPILING

Surface stockpiling of underground ore from the Michigan iron mines has long been a problem during the cold snowy winter months.

The newest stockpiling system to be placed in operation is at the "B" shaft of the Mather mine at Negaunee, Michigan, operated by the Cleveland-Cliffs Iron Company for the Negaunee Mine Company. The new conveyor belt system, with a capacity of 8,000 tons per day, has been carefully engineered and constructed to assure trouble-free operation at temperatures as low as 40° below zero.

The Main Belt

The main belt is 36-inches wide and 655-feet long. It is driven at 400-feet-per-minute by a 60-hp electric motor. Belting was supplied by The U. S. Rubber Company. Special impact idlers at loading points of all belts in the system are of Chain Belt design, while all other idlers are of Stearns manufacture. The conveyor operates on a framework fabricated by Bethlehem

Steel Company, which is a stockholder in The Negaunee Mine Company.

Enclosed Gallery

The belt is completely inclosed in a gallery which extends from the crushing plant, in the shaft headframe, to the head pulley end. The gallery has a reinforced-concrete floor, corrugated iron sides, and roofing fastened to a structural steel framework. Four-foot clearance on either side of the belt assures adequate room for servicing.

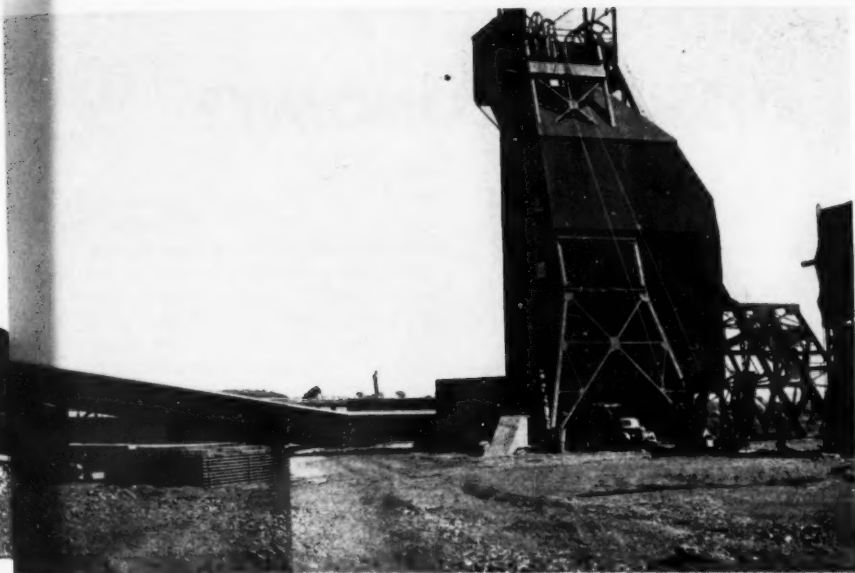
Favorable terrain adjacent to the shaft permits stockpiling of ore 65-feet high by elevating the ore less than one-half the stockpile height.

Ore for the "B" Shaft stockpile is hoisted in two, 12-ton, Kimberley-type skips operating in counter balance at a speed of 2,500-feet-per-minute. Present production centers on the sixth level (2,200 feet). The skips dump into a 35-ton-capacity pocket over a 16 by 21 foot Kennedy Van Saun pan feeder,

which, in turn, discharges onto a Simplicity scalping screen with elongated openings. Screen oversize is chuted to a 24 by 36 inch Allis-Chalmers jaw crusher. Crusher undersize drops onto a 48-inch-wide belt. Scalping screen undersize is transferred to the same belt by a smaller pan feeder. The ore on the 48-inch belt feeds directly onto the main stockpiling conveyor belt and is automatically weighed by a Merrick Weightometer placed 30 feet from the point of loading.

Flip the Belt

Ore dumped from the skip of the Mather mine contains moisture. In cold weather this moisture would freeze and, together with ore particles, would present a serious build-up problem on return idlers if the conveyor followed the usual pattern of belt-conveyor design. However, the belt at the Mather mine is made to flip 180 degrees at the head pulley end, with a reverse flip of 180 degrees just before being loaded at the tail pulley end. This double



Load Railroad Cars in Summer

Provision will be made for the stockpiling conveyor to load ore directly to railroad cars during the summer months, as at a point near the tail pulley end it bridges two sets of parallel railroad tracks of the Lake Superior and Ishpeming Railroad. Ore will be tripped from the conveyor belt at a point directly over a large loading pocket to be erected over the tracks, and that, in turn, will load to one or two cars simultaneously. This hopper is not designed for storage but rather as a collection unit to direct the flow of ore to cars. The hopper will be of sufficient size to hold the flow of ore while cars are being switched into position under it. The stockpile built up in the winter time is loaded into rail cars by a Bucyrus-Erie 120 B four-yard electric shovel.

Conveyor Is Economical

The primary reason for installation of the belt conveyor is one of economy. It represents a saving in the cost of installation as well as in the cost of daily operation. To stockpile a tonnage equivalent to that which the belt can handle would require two or possibly three larry cars. Each larry car would require an individual 75-hp motor and an operator. The entire conveyor belt requires only one operator and one 60-hp motor.

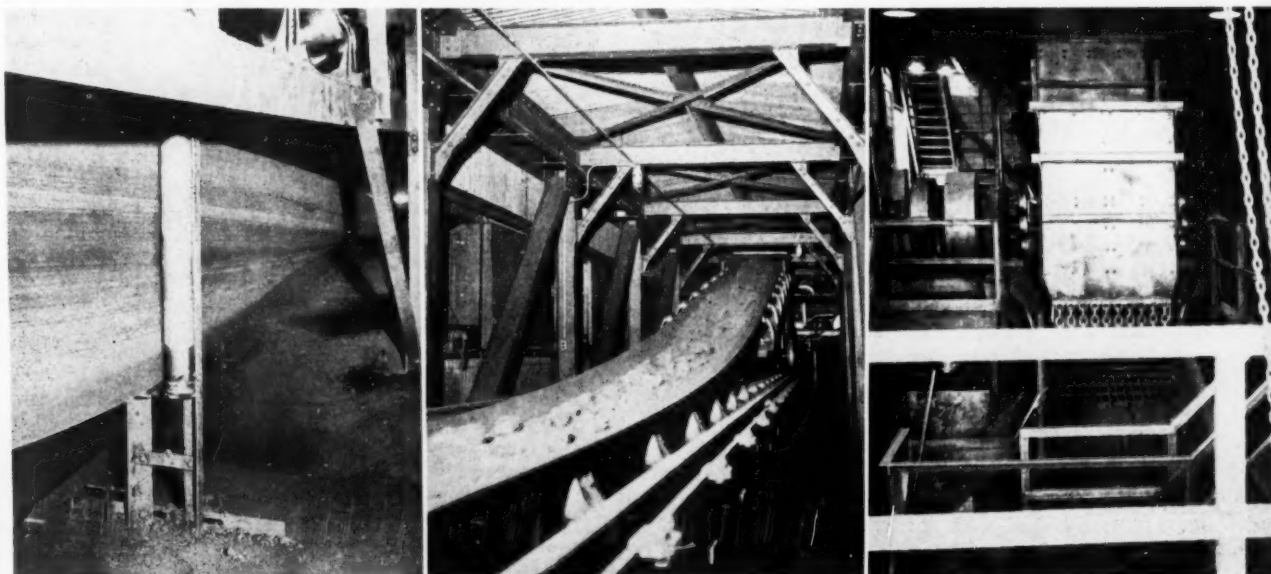
flip means that the clean side of the belt is always presented to the idlers and the dirty side is always on top, thus preventing build-up of ice and ore particles on the idlers with a resultant injury to the belt.

A travelling transfer car can be positioned at any point along the length of the belt. A short belt conveyor operating at right angles to the main belt is part of the transfer

car. The short conveyor discharges on either side of the gallery through ports. These ports are all equipped with steel doors and each is shielded from the elements by a hood on the outside of the gallery.

At the present time, only the primary conveyor belt is in operation, but when completed the stockpile area will be served by three additional belts.

LEFT: Tail pulley end of the conveyor belt immediately ahead of the loading point. The belt is travelling from left to right with the load-bearing side in the foreground. To the left of the picture, the loaded side was facing up (on top of the return rollers). CENTER: Interior of the gallery showing the transfer car at the far end. The transfer belt is discharging through a port on the right. The doors covering the ports can be seen on the left. RIGHT: Skips discharge onto a pane feeder inclosed in steel sheets in center background. The feeder discharges onto the scalping screen in the foreground.



IS MINERAL SELF-SUFFICIENCY A WEAK SPOT IN RUSSIA'S ECONOMY?

Mr. Shimkin is the author of "Minerals—A Key to Soviet Power" (Harvard University Press, 1951), from which data for this article have been taken. Part I of the article appeared in the September 1951 issue of Mining World and outlined production, changes in regional output, the eastward production shift, progress in technology and foreign trade.—Ed.

In prewar years, Soviet mineral exports exceeded imports by a substantial margin. Between 1926 and 1937, these exports increased by more than five times, and changed radically in composition, although ferrous metals, platinum and asbestos remained important throughout. Petroleum and coal exports reached a peak in 1932, and were thereafter superseded by gold, fertilizer, especially apatite. Exports became significant in the late 1930's. Russia's greatest customers were the United States (gold, platinum, manganese ore), Italy (petroleum and coal), France (manganese ore, petroleum), and Germany (petroleum, manganese, asbestos, and platinum). Data on Soviet postwar exports are almost totally lacking; those sent to the United States during the brief period of friendly relations in 1946 corresponded closely to the late prewar pattern of commodities. In addition, the U.S.S.R. is known to be supplying iron ore to Eastern Europe. Nevertheless, it is clear that Soviet mineral imports today exceed exports by a substantial margin.

CONSUMPTION SELF-SUFFICIENCY MATERIALS CONTROL

For the period 1926-1938, direct information on Soviet mineral consumption and utilization, as distinguished from apparent supply, is relatively abundant and seemingly reliable¹⁰. Thereafter, the data became fragmentary, limited essentially to qualitative descriptions of utilization patterns and shortages¹¹. This fact, together with the grave uncertainties surrounding Russia's postwar trade in minerals, subjects

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any treatment of Soviet mineral consumption after 1937 to large probable error. It is my belief, however, that the values of the larger aggregates of consumption discussed immediately below are not far from the true facts. In contrast, the data on consumption for individual minerals in later years must be considered purely as indications of probable trends.

With these cautions in mind, let us examine the apparent development of mineral consumption in the Soviet Union since 1926 (See Fig. 45). Weighting 19 major minerals (excluding scrap) at U. S. 1937 prices and relating the sum to a corresponding average for 1935-39 in the United States designated as 100 gives the Index of Mineral Consumption used in this article. In the Soviet Union, this Index grew five-fold between 1926 and 1937, then rose another 11 percent by 1940, to reach a level of 29.4. During World War II, the Index dropped sharply at first, but then recovered substantially, as a result of Soviet efforts and Lend Lease. In consequence, consumption in 1944 totalled almost 80 percent of the prewar peak. Since the war, Soviet mineral consumption has again been rising rapidly, to gain a level 47 percent above the prewar high in 1950.

Present Consumption Trends

The secular trends in the structure of Soviet mineral consumption were profoundly disrupted by World War II, but have re-appeared since then. In contrast to American experience since 1899, they manifest a growing share for ferrous metals, a declining one for fuels. Soviet peacetime trends in non-ferrous metals consumption as a whole correspond to the American record since 1919; so also do non-metals, if 1926 be excluded. In the war year, 1944, the Soviet consumption of non-ferrous metals—particularly Lend-Leased aluminum and copper—was relatively very high; that of fuel, extremely low.

What has been the behavior of in-

dividual minerals in relation to the movements of the Index of Mineral Consumption? Among metals, pig iron, manganese, copper and zinc have advanced in fair correspondence to the Index. However, the consumption of aluminum, nickel, and various "new" metals such as cadmium has grown much more rapidly; that of tungsten, lead, tin, mercury and probably antimony, more slowly. Among fuels and other non-metals, the growths of natural gas, coal, asbestos and gypsum appear to have approximated the average trend. Diamonds, fertilizers, sulphur minerals, and high-grade refractories such as magnesite have moved more rapidly, while the consumption of petroleum, salt and clays seems to have lagged.

Adequacy of Supplies

Assessment of the adequacy of Soviet mineral supplies is a difficult problem; to attack it, three lines of evidence are open: comparisons of Soviet consumption with production goals, comparisons with normalized American consumption trends, and consideration of special factors affecting Russian requirements. The use of Soviet production goals as criteria of self-sufficiency may be regarded as essentially valid, for this has been explicitly a basic aim of Russia's plans. At the same time, these minerals which have been produced in large degree for export, namely, manganese, asbestos, and during 1932, petroleum, must be excluded. In addition, since the Fourth Five-Year-Plan targets reflected not only production ambitions but also adjustments to war-reduced capacities, it seems appropriate to select the highest output figures designated either in the Third or Fourth Five-Year Plans as points of reference. With these adjustments, the relations of actual to presumed target consumptions approximated 70 percent in 1932, 80 percent in 1937, and 100 percent in 1950. The patterns for individual minerals shifted in the following manner.

Low Standard of Consumption

Comparisons with American experience may be made at two

levels: for mineral consumption as a whole, and for individual minerals. Soviet mineral consumption in the prewar period and, by extrapolation, in 1950, was low by American standards, relative to the sizes and rates of growth achieved in that country's gross industrial output and "gross national material product" (Soviet-concept GNP). In part, this has reflected structural differences between the two economies, especially the greater importance for Russia of agriculture and other non "mineral-intensive" sectors. But, to an appreciable degree, skimping or even doing without have been evident in the Soviet economy, as the remarks on materials control will detail.

The general structural differences between the mineral consumption patterns of the Soviet Union and the United States have already been mentioned. Figure 45 provides more detail. It shows that, in 1926, Soviet metals consumption was relatively low, except for mercury, antimony, and pig iron. High petroleum consumption—even by American standards!—moderately low coal, and negligible natural-gas, consumption were also characteristic. The pattern for non-metallics included very high salt and china clay, and high asbestos and phosphate rock consumption, relative to the Index of Mineral Consumption. Sulphur and pyrite utilization was low; that of industrial diamonds, absent. In the group of steel-making basics, normalized to pig-iron output, all but newly-introduced molybdenum were marked by very high consumption.

By 1937, a marked convergency toward American practice had taken place. Excluding bromine, diamonds, natural gas, and several rare metals, the consumption of no mineral was now less than 40 percent of Hypothetical Standard; while only magnesite, emery and corundum exceeded this standard by more than 200 percent. Thus, the structure of Soviet mineral consumption in 1937 corresponded more closely to American than did either the German or the British of that period. At the same time, except for soaring pig iron and mercury, metals consumption was low. In fuels, coal and lignite rose sharply, while petroleum fell to a low level; natural gas remained negligible. Convergence toward American practice was notable in other non-metallics, and steel-making basics, although phosphate rock consumption climbed to a very high level, and molybdenum utilization was still slight.

An essentially similar relationship

Fig. 45
Estimates of Approximate Mineral Consumptions: Actual and Relative to American Practice

Item	1926	1937	1944	1947	1950						
Index of Mineral Consumption (U.S. 1935-39 aver. = 100)											
Composition (Percentage of total in U.S. 1937 prices) ¹											
Ferrous metals ¹	24.6%	32.2%	21.7%	24.0%	26.8%						
Nonferrous metals ²	8.8%	10.7%	27.0%	12.3%	13.2%						
Fuels ³	56.7%	49.6%	47.8%	57.4%	51.7%						
Other nonmetallics ⁴	9.8%	7.4%	3.5%	6.2%	8.2%						
Estimated Consumption of Selected Minerals											
	A ⁵ + R ⁶ + +	A ⁵ R ⁶	A ⁵ R ⁶	A ⁵ R ⁶	A ⁵ R ⁶	Relative Peace ⁷ War ⁸					
Group A, ⁷ METALS											
Antimony	0.8	150%	2.6	65%	2.5	83%	4.0	135%	x	x	x
Mercury	0.14	270%	0.3	105%	x	x	x	x	x	x	x
Copper	28.7	87%	161.5	90%	268	137%	176	90%	272	92%	75%
Lead	23.2	77%	87.8	90%	75	76%	90	89%	143	94%	77%
Tin	2.1	60%	11.3	63%	99	100%	8	100%	10.5	69%	69%
Zinc	16.6	71%	77.2	63%	90	84%	85	66%	142	73%	11
Aluminum	1.8	43%	40.2	89%	255	270%	90	112%	162	134%	91%
Nickel ¹⁰	0.02	2%	9.7	91%	11.3	70%	11.6	96%	20	100%	60%
Pig iron (mill.m.t.)	2.22	119%	14.0	194%	8.0	106%	11.1	127%	18.9	154%	134%
FUELS											
Coal and lignite (bitum. equiv.), mill m.t.	24.1	93%	115.0	112%	108.0	130%	164.0	181%	241.0	176%	153%
Petroleum (mill m.t.)	6.66	126%	26.8	70%	19.5	61%	28.9	63%	35.0	50%	11
Natural gas (mill. cu. m.)	228	13%	1,980	12%	1,000	7%	2,100	10%	2,600	8%	11
NONMETALLICS											
Salt (mill.m.t.)	1.62	500%	3.5	170%	2.0	100%	3.0	122%	3.0	105%	105%
China clay (mill.m.t.)	182	590%	293	160%	?	?	?	?	x	x	x
Asbestos	17.3	160%	58.8	87%	35	72%	66	72%	143	100%	11
Gypsum (mill.m.t.)	0.29	107%	1.2	107%	0.3	60%	0.9	70%	2.0	100%	11
Phosphate rock (mill.m.t.)	0.11	160%	2.1	300% ¹²	0.4	60% ¹²	x	x	3.0	175% ¹²	11
Sulfur and pyrite (S. cont.)	65	83%	617	115%	445	93%	600	99%	900	95%	11
Diamonds (thous. carats)	..	..	25	5%	450	25%	200	30%	300	30%	10%
Group B, ¹³											
Manganese ore	0.3	450%	1.5	265%	x	x	x	x	x	x	x
Tungsten (60% WO ₃)	0.7	345%	3.0	130%	5.5	210%	2.5	160%	x	x	?
Molybdenum (content)	.006	18%	1.4	60%	1.2	60%	0.9	45%	?	?	?
Fire clay	749	520%	2500	250%	x	x	x	x	x	x	x
Magnesite	103	900%	846	840%	x	x	x	x	x	x	x
Andalusite	..	..	1.0	74%	3.0	117%	?	?	?	?	?

Sources: Pertinent Sections of Review of Minerals; Appendix I, Section 2; Appendix II.

Notes: 1. Includes pig iron, Spiegeleisen, ferro-manganese, ferro-silicon, and half of nickel. 2. Includes aluminum, copper, lead, one half of nickel, tin, and zinc. 3. Includes coal, lignite, natural gas and petroleum. 4. Includes asbestos, cement, industrial diamonds, calcinated gypsum, salt, sulfur and pyrite. 5. Physical quantities in thousands of metric tons, except as indicated. 6. Normalized to U.S. consumption for the same years, cf. also notes 7, 8, 9, and 13. 7. Normalized to U.S. consumption as an Index of Mineral Consumption level of 100, cf. Appendix I, Section 2. 8. Normalized to U.S. consumption in 1947, cf. Appendix I, Section 2. 9. Normalized to U.S. consumption in 1944, cf. Appendix I, Section 2. 10. Excluding the nickel content of naturally-alloyed pig irons. 11. Wartime rate lower than peacetime. 12. Note, however, the relation to the U.S. as input per cultivated acre: 1926, 5%; 1937, 77%; 1944, 10-12%; 1950, 40%. Includes, for the U.S.S.R., superphosphates (18.5% P₂O₅) and ground phosphate rock. 13. Steel-making basics, normalized to pig iron consumption in the U.S., cf. Appendix I, Section 2.

to the American wartime pattern persisted through World War II, except that non-metallics dropped to low levels, even for a wartime period. Furthermore, a heavy military effort required—and Lend-Lease shipments permitted—very high aluminum and copper consumption. In contrast, the upward deviation of pig iron consumption from American practice was reduced by heavy losses of capacity.

So far as is known or can be approximately guessed, the structures of Soviet and American mineral consumption have changed in corresponding manners in the postwar period too. The principal relative changes between 1937 and 1950 have been strengthenings of Soviet aluminum, antimony, coal and lignite consumption; reductions in pig iron and non-metallics, the latter now being generally at low levels. The Soviet consumption pattern in 1950 apparently corresponded to peacetime needs; for full scale mobilization, the current supply of non-ferrous metals, especially, seemed scanty.

Factors of Mineral Demand

Beyond the comparisons with Soviet production goals and with American practice, consideration must be given to four factors basically affecting Russia's needs for minerals. The first is the large scale of the country's agricultural requirements. It should be noted that the population of the Soviet Union has climbed from 147,000,000 persons in 1926 to 170,000,000 in 1939 and, with territorial acquisitions, to 193,-

000,000 in 1940; 201,000,000 in 1950¹². Acreage under cultivation has likewise increased; 285,000,000 in 1927/28, 334,000,000 in 1937, and some 390,000,000 in 1950, compared to an average of 350,000,000 acres for the United States in recent years¹³. At the same time, the catastrophes of collectivization and of World War II drastically cut the numbers of horses and other livestock. Thus, in 1927, farm livestock totalled 30,800,000 horses, 66,400,000 cattle, 132,000,000 sheep and goats, and 22,600,000 hogs. By 1932, the corresponding figures were only 19,600,000, 40,700,000, 52,100,000, and 11,600,000, respectively. In January 1941, the livestock numbers, even including gains from seized territories, were still far smaller than in 1927: 21,300,000 horses, 55,100,000 cattle, 91,800,000 sheep and goats, and 28,200,000 hogs. A decade later, the 1941 figures had not yet been recovered; Russia's farms held but 12,700,000 horses, 57,200,000 cattle, 99,000,000 sheep and goats, and 24,100,000 hogs¹⁴. Jasny's conclusion that the Soviet investment in agriculture prior to World War II barely offset the losses in tractive power and fertilizer resulting from livestock reductions may in large part be applied also to more recent years¹⁵. In all, the healthy development of Soviet agriculture requires enormous quantities of fertilizers, sulphur minerals, salt and, for mechanization, large amounts of petroleum products and metals. For these minerals, Soviet plans seem to have understated the country's needs.

Other Mineral-Need Factors

The second factor has been Russia's rapid rate of urbanization and, consequently, of increasing demands for housing and utilities, since 1926. Her urban population grew from 26,300,000 persons in 1926 to 55,900,000 in 1939, and about 68,000,000, including annexed territories, in 1950¹⁶. In the United States, the achievement of a comparable increase, from 30,000,000 to 74,000,000 urban dwellers, extended from 1900 to 1940. Because of this factor, Soviet needs for cement, gypsum, asphalt, asbestos, ground mica, and salt (via soda ash for window glass), and for base metals, have been unusually great.

The heavy load of armaments carried by the U.S.S.R. since the mid-1930's has also affected the structure of mineral demand. Judging by American experience, this factor has doubled or more than doubled the needs that might otherwise exist for piezo-electric quartz crystals, industrial diamonds, beryl, tantalum, andalusite, aluminum, and tungsten. It has substantially raised demands for manganese, molybdenum, corundum, bromine, niobium and cobalt; to a lesser degree, for pig iron, copper, strontium, arsenic, and coal.

The fourth and final factor has been the high losses in production, short equipment and product life, and limited use of scrap characterizing Soviet manufacturing, especially prior to World War II¹⁷.

Supply Status Summarized

To summarize the impressions gained from these three approaches to the problem of the adequacy of Russia's mineral supplies:

a. Total mineral consumption has been definitely low in relation to imputed demand throughout the past 25 years.

b. Within this framework of an overall shortage considerable shifts in the relative adequacy of supply of individual minerals have taken place. Non-ferrous metals supplies as a whole have remained tight, but aluminum and copper, for peacetime requirements, are much less so than in the past. With some exceptions, such as molybdenum and cobalt, the U.S.S.R. has been characterized by a high consumption of pig iron and other steel-making basics. In fuels, natural gas consumption has remained virtually negligible, but coal and lignite have shifted from a weak to a strong position; petroleum from strong, to very weak. In other non-metallics, Soviet consumption has

MINERAL CONSUMPTION TRENDS 1932, 1937 AND 1950

Actual consumption as percent of pro- duction goal	1932	1937	1950
Over 120	—	Nickel, copper, potassium salts	—
95 to 110	Natural gas	Chromite, barite, China clay, gypsum	Copper, zinc, coal and lignite, cement
70 to 90	Coal and lignite, petroleum, salt	Zinc, pig iron, coal and lignite, natural gas, ce- ment, sulphuric acid, soda ash	Aluminum, pig iron, petroleum, super- phosphates potassium salts, sulphuric acid, salt
40 to 65	Copper, pig iron, cement, sulfuric acid	Aluminum, pe- troleum, super- phosphates, salt	Soda ash
Under 40	Zinc, super- phosphates	—	Natural gas

generally grown too slowly. Considering Russia's enormous agricultural requirements and acute need for housing, the consumption of non-metallic minerals, particularly fertilizers, sulphur minerals, and salt, has been very low since 1937.

c. As mentioned under Foreign Trade, the scales of Russia's mineral imports in the postwar and late pre-war periods have been roughly comparable. On the other hand, the composition of imports has changed radically. In the earlier period Soviet imports were limited essentially to non-ferrous and ferro-alloying metals; postwar, fuels have predominated. Furthermore, the major sources of imported supplies have shifted from the United States, United Kingdom and Germany, to Russia's Eastern European and Far Eastern satellites. At the same time, a few minerals, especially copper, diamonds, and tin, still flow in from areas outside of Soviet control.

d. The large stockpiles of deficient non-ferrous and ferro-alloying metals built up between 1937 and 1939 were reconstituted through Lend-Lease aid by the end of World War II. Their augmentation is unquestionably continuing. Their existence greatly reduces the economic hazards to the Soviet Union which might be developed by mobilization.

Meeting Shortage Problem

How has the Soviet government met the problem of perennial shortages in minerals? The three mechanisms of materials control appear to have been highly selective allocation, intensification in the use of capacity, and substitution. Pricing has not been a significant agency for achieving materials control.

Within the limits of available information, it appears that, over the past 15 years, the following economic sectors have received highly preferential treatment in the allocation of minerals; the steel industry, especially machine-tool manufacturing; electrical equipment, rubber, and aviation; as well as agriculture, particularly the production of fibers and sugar. The railroads and electrical-power production seem to have held middle ranks in priority. Proportionally, the railroads have received large quantities of ferrous metals and coal, but their allocation of petroleum, copper and, since the war, tin have been rigidly restrained. An exceptionally large part of Soviet-coal consumption has gone to electrical-power production, but the use of petroleum for this purpose has been restricted since the

RUSSIAN MINERALS RESERVE STATUS

<i>Large Surplus Possible</i>	<i>Safe Supplies</i>	<i>Doubtful Adequacies</i>	<i>Moderate To Acute Deficiencies</i>
Andalusite	Antimony	Arsenic	Bismuth
Asbestos	Chromite	Barite	Borax
Bromine	Emery	Bauxite	Cadmium
Cerium and Rare Earths	Iodine	Beryllium	Cobalt
China clay	Mercury	Copper	Corundum
Fire clay	Petroleum	Nickel	Diamonds
Coal and lignite	Platinum	Zirconium	Lead
Fluorspar	Pyrite		Molybdenum
Graphite	Sulphur		Natural gas
Gypsum			Strontium
Iron ore			Talc (high grade)
Mica			Thorium
Magnesite and dolomite			Tin
Manganese			Uranium
Phosphate rock			Tungsten
Potassium salts			Zinc
Salt			
Titanium			
Vanadium			

mid-1930's. The economic sectors of low priority have apparently included wire but not radio communications; the petroleum industry, starved for steel, sulphuric acid, and, before the war, barite; paints and pigments, allotted substantial quantities of zinc and china clay, but little or no cobalt, lead, talc, and titanium; and the cellulose, paper, textile, glass, and food-processing industries. Domestic consumption has, of course, fared worst of all.

Since 1928, the intensity of use in the Soviet railroads has been increased enormously. Thus, the ton-kilometers of freight hauled per kilometer of first-track line have risen from 2.0 in 1928 to 6.9 in 1937 and about 8.3 in 1950¹⁸. Another area of basic savings has been in urban housing; per capita space fell from 6.0 square meters in 1928 to about 5.0 in 1937, and 4.5 in 1950¹⁹. Evidence of attempted economies in plant expansion has also come to light. Thus, the postwar machine-tool additions at the ZIS automotive factory in Moscow were simply jammed into an already crowded floorspace²⁰.

In substitution, the Soviet record has been uneven. Among the illustrations of successful substitution has been the increasing use of naturally alloyed (chrome-, nickel-, vanadium- or titanium-bearing) pig irons in low-alloy structural steels. During World War II and since, the Soviets sharply reduced their demands for machining, and thus a

wide range of ferro-alloys, by substituting casting, including that of artillery shells and valves. Nickel and tungsten demands have also been held down by replacement with more readily available manganese, chrome and vanadium, particularly for stainless steels, tank armor and artillery-barrel liners. Following German practice, the Soviets have made large use of local, low-grade lignite deposits as fuels for central electrical-power plants. In addition, coal-brasses (pyrite) washed from lignite are now a major source of sulphur in the U.S.S.R. A final significant development has been the use of abundant natural sodium sulphate for the simultaneous manufacture of ammonium sulphate and soda ash (the Belopol'skii synthesis), replacing acutely scarce sulphuric acid.

In many other instances, however, substitutions have been achieved only at the cost of much poorer operating characteristics, shorter life, and other seriously adverse effects. Noteworthy failures have been the lavish use of carbon tool-steels prior to World War II; the attempted replacement of cobalt, tungsten and nickel by manganese and chrome in stellites and electrical-resistance wires; and the use of iron or copper-coated steel wires rather than conventional lines and cables in wire communications. Such expedients as the use of vehicular attachments to produce combustible gas from wood blocks or peat; the replacement of

superphosphates by ground phosphate rock; or that of galvanized roofing iron by tar paper need no comment. Interestingly enough, the Soviets appear never to have built up significant industries for producing artificial abrasives, graphite, or synthetic liquid fuels.

RESERVES & POTENTIALS

So far as I can tell, no major region of the Soviet Union has yet been subjected to genuinely thorough geological study and prospecting, by means of surface mapping, drilling and geo-physical and geo-chemical techniques. In fact, only European Russia south of 62° N. and excluding the high ranges of the Caucasus, the Urals between 50° and 62° N., and small eastern areas such as the Kuznetsk Basin in western Siberia and the Fergana Valley in central Asia can be termed reasonably well known. For the rest of the country, present knowledge appears to grade from rough economic assessment to complete ignorance. Because of this fact, and because even the geological reconnaissances covering large areas have revealed extensive promising formations, a sharp distinction must be made between more-or-less known reserves and ultimate potentialities in assessing Russia's mineral wealth.

Generalizations based even on quantitatively assessed reserves must be viewed with great caution. The available information dates essentially from the late prewar period; the quality and certainty of the reserves fluctuates greatly. Re-examination of early basic studies and collation of later information have been able to remedy these deficiencies only to a moderate extent.

The degree to which these known reserves may be adequate to satisfy foreseeable Soviet needs can, of course, be answered only in hypothetical form. I have adopted the following criteria of "sufficiency": the capacity to meet requirements to 1970 at an average Index of Mineral Consumption of 83 (twice that of 1950), without wars or intensive mobilizations during the intervening period, but with the maintenance of a mineral-consumption structure corresponding to an extrapolation (to 1960) of the American. Under such conditions the classification of minerals by reserve status is shown in the Mineral Reserve Status, see box.

Satellite Reserve Status

It should be noted that the Soviet satellites are lacking or very weak in andalusite, asbestos, cerium and rare earths, mica, phosphate rock, titanium and vanadium.

For those minerals considered in "safe supply" all but antimony represent moderate to severe satellite deficiencies.

Imports from the satellites could eliminate the barite, bauxite, talc and tungsten deficiencies, in addition to ameliorating those in bismuth, cadmium, lead, molybdenum, tin, uranium and zinc. The satellite resources of the other minerals appear to be negligible.

Mineral Distribution Poor

The known mineral resources of the Soviet Union are distributed very unevenly. In general, Russia west of the Urals has the overwhelming bulk of the country's iron ore, manganese, and petroleum reserves; the eastern regions predominate equally in coal, nonferrous metals and gold. (See Figure 46b *Mining World*, September 1951.) For established reserves, the richest economic regions are the Ukrainian, especially endowed in iron ore, manganese, coal, salt, and clays; the Transcaucasian, with the greatest resources of petroleum, and rich manganese deposits; the Urals, characterized by an extraordinary diversity of minerals, especially asbestos, bauxite, beryllium, chromite, cobalt, copper, iron ore, nickel, platinum, and pyrite, though somewhat weak in fuels; and Turkmenistan, the nation's primary source of base metals. In contrast, the Baltic, central Russian and northwest Russian areas (the last, excluding the metalliferous region of the Kola Peninsula, north of the Arctic Circle), are extremely poor in assessed mineral resources.

Impressive Mineral Future

For the long-term future, Russia's mineral-producing possibilities appear very impressive. By classifying known Soviet deposits by geological province, formation and association, a classification which is naturally most crude and approximate, some concordances appear (See Geolith Division Map in *Mining World*, September, 1951.)

Of the areas of Pre-Cambrian formation, the Azovo-Podol'sk and Baltic Shields, the Yenisei Ridge and the Eastern Sayan-Aldan system already have proven importance, particularly for iron ore, gold, mica, graphite, apatite, nickel, rare earths and radio-active minerals. Additional discoveries in these regions

are likely; so too are completely new finds in the scarcely explored Pre-Cambrian regions of the Caucasus, the Pomirs, the Kazakhstan Upland, the Taimyr Peninsula, and the Central Siberian and Bureya Uplands.

Again, the Urals are not unique. Closely similar regions of severe Paleozoic diastrophism with extensive acidic and basic to ultra-basic intrusion are the Kazakhstan Upland, the Lena-Yenisei System, and the Western Sayan Ranges. The first of these areas has already become predominant in copper; its extensive basic, (possibly, ultra-basic) intrusions promise well for current Soviet iron-ore prospecting. The other two areas have been barely explored. Yet small likelihood exists of the uniqueness of such deposits as Noril'sk, rich in platinum metals, copper, nickel and cobalt, in the former; and Ak-Tovrak, second only to Bazhenov in asbestos reserves, in the latter.

Similar inferences may be drawn for areas of sedimentary deposition. The great bulk of Soviet petroleum reserves are associated with limited areas of Cenozoic marine formation. But these remnants of the Thetis Ocean and its successors extend in their entirety from the Ukraine across the North Caucasus and Lower Volga, into Central Asia, reaching the Arctic in Western Siberia. The fraction explored is indeed small.

In all, to place any limit on ultimate Soviet potentialities in mineral production would be very foolish. The Kazakhstan Uplands and Lena-Yenisei System are, in my opinion, exceptionally promising. But, at the same time, the magnitude and duration of the job of translating ultimate possibilities into realities must be held foremost. A generation or more of unceasing effort would be little for the task.

10. Among the more important sources are Gutsait and Spivak (1937) and Shul'in (1940), for ferrous metals; Polyakov (1939) and Tsarkov (1940), for non-ferrous metals, and Frobst (1939), for fuels. 11. See, especially Agapov et al. (1947). 12. See Lorimer (1946, pp. 112, 184-190); for 1950, approximated from electoral district data, Cf. *Pravda*, 12 Jan. 1950. 13. Jasny (1949, p. 503). 14. Jasny (1949, p. 797); for 1950, *Izvestiya*, April 17, 1951. 15. See Jasny (1949, esp. pp. 457-460). 16. Lorimer (1946, p. 154); for 1950, estimated from *Pravda*, 12 Jan. 1950, and postwar politico-administrative maps. 17. See Tsarkov (1940), Shimkin (1948). 18. Calculated from Garbutt (1949, pp. 17, 81); Hunter (1950, pp. 4-6), and *Izvestiya*, April 17, 1951. 19. Calculated from scattered data, esp. TsUNKaU 1932, p. 301, and 1935, p. 631, correlated with Dobb (1948, p. 286 n.), the latter being dated as 1937 from *Slovar Spravochnik po Sots.-Ek. Statistike*, 1948, p. 351. For 1940, 5% was added to the 1937 figure; for 1950, reconstruction realized during World War II (Bergson et al., 1949) and during 1946-50 (Bulganin, 1950) have been added. The figures are maximal, since no factor for deterioration in existing housing has been allowed. 20. See Shimkin (1950a).

OUTSTANDING POST-WAR RECORD OF ATOK-BIG WEDGE MINING CO., INC.

This prominent Philippine gold producer was the first to completely rehabilitate its Baguio mine and mill and resume profitable output

By John M. White

During the decade just prior to World War II the Philippine Islands became one of the important gold producing areas of the world. Gold production during this era increased tenfold reaching an annual valuation of some \$50,000,000 in 1941. Mining became a leading industry of the Islands, second only in importance to agriculture. The Japanese invasion brought this rapidly expanding industry to an abrupt halt. During the Japanese occupation idle mining and milling plants greatly deteriorated, were looted of all removable equipment, and in some cases completely destroyed by wartime activities.

The Atok-Big Wedge Mining Company, Inc. near Baguio, Mt. Province enjoys the distinction of being the first of the gold mines of the Philippines to rehabilitate its properties, resume mining and milling operations, and to reinstitute dividend payments to its shareholders. Rehabilitation was completed at a cost of P1,351,013.66 (\$675,506.83), a figure estimated to be three times prewar costs. Officially, the mill started grinding ore on March 16, 1947, and the first postwar dividend to Atok shareholders was paid October 1, 1947.

In 1931 the Big Wedge Mining Company was organized and shortly thereafter acquired 51 claims. Subsequently others were staked until the present total of 84 whole or fraction claims were acquired. An exploration program was started and by 1932 sufficient ore was considered developed to warrant the construction of a 50 ton mill. In June, 1934, the Big Wedge Mining Company entered into an operating agreement with the Atok Mining Company whereby the latter assumed complete charge of operations on a profit-sharing basis. At that time an extensive development program was inaugurated. Additional ore was developed on the Mesaba



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vein which had been supplying the small mill, and new ore bodies were discovered and developed on the Broadway and Frank veins.

The General Engineering Company was engaged to perform metallurgical test work, to design the flow sheet, and to supply most of

the equipment for a new 150-ton mill. The construction of the plant was completed in 1936 and the mill was put into operation in July of that year. As ore deliveries increased from the Broadway and Frank veins, which carried considerable quantities of chalcopyrite and bornite, it became necessary to add a small flotation installation in March, 1937, for the purpose of scalping off these copper minerals, with the flotation tails then going to the cyanide plant.

Keystone Vein Development

Operations were carried on in a normal manner without any outstanding new development until mid 1939 when a 4,000 foot cross-cut, in progress for over a year, reached its objective, the Keystone vein. This vein had been highly productive in both the Benguet Consolidated and Antamok Goldfield mines further to the east. Although the vein structure was strong, values on Level 1 were below economic grade. A shaft was sunk in the footwall. A cross-cut driven across the vein on Level 2, encountered very good values. The shaft was continued downward and as the vein was explored on each succeeding level, the exist-

Surface buildings at the Atok-Big Wedge mines at Baguio. Japanese war damage was quickly repaired and the mill resumed operation on March 16, 1947. Adit No. 1 and mine buildings are at the left.





Two ball mills each in closed circuit with a rake classifier are shown in this interior view of the mill.

ence of a large tonnage of good grade ore was proven.

As a result of the consequent large increase in the ore reserve, with indications of further tonnage of mineable ore, a decision was made to enlarge the milling plant; and all the necessary machinery for increasing capacity to 400 tons per day was ordered in the fall of 1940.

In February, 1941, mining operations on the Broadway and Frank veins were discontinued in order to handle the higher grade and more accessible ore from the rich Keystone vein.

The construction of the addition to the mill was completed in July, 1941, and from that time until World War II, 400 tons of ore per day were milled, all of which came from the Keystone vein. With the outbreak of the war in December, 1941, operations were suspended and shortly thereafter most of the staff members were interned by the Japanese.

Post-War Rehabilitation

After liberation in the spring of 1945, several staff members returned to the mine to find that, although the plant was not burned and the heavy equipment remained, all light equipment, the laborers' cottages and most of the accessories to the heavy equipment had been removed. Three years' abandonment without upkeep or maintenance in the tropical climate resulted in serious deterioration of all remaining plant buildings and of some machinery and equipment as well as all underground workings in general.

Repair and salvage crews were hired, but as the war against Japan was still in progress, tools, supplies and almost everything else needed for the work at hand were practically unobtainable. However, temporary repairs were made on build-

ings, and machinery was cleaned and greased. After the surrender of Japan, orders were placed for supplies and needed equipment, but much delay was experienced in their arrival.

Early in 1946 the rehabilitation of underground workings was begun. This also was a slow process at first, due to access being confined to only one adit which was in bad condition, but as the work progressed and more and more headings were reached, thus affording additional points of attack, the rate of rehabilitation was accelerated. The greatest single stroke of ill fortune suffered in the mine was the caving beyond practical repair of No. 1 Shaft. The other pre-war Shaft, No. 2, was in fair condition but required re-timbering for its entire depth of 500 feet. Most of the drifts and stopes were badly caved, while the counter drifts and cross cuts were caved to a lesser extent. A new Shaft, No. 3, was sunk to replace No. 1 Shaft.

After great effort and expense the mine and surface plant were sufficiently rehabilitated to permit the resumption of milling operations. No. 1 milling unit was started in March, 1947, and No. 2 unit was started a month later, and both have been operating continuously since.

Atok, Big Wedge Merge

Early in September, 1947, negotiations were initiated for the unification of the Atok Gold Mining Company and the Big Wedge Mining Company. It was the opinion of the Officers and Boards of Directors of both corporations that such a step would be mutually advantageous for many reasons, the most important of which were a reduction of office and staff expense, a unified and hence more efficient management, and the elimination of useless, and often-

times costly, friction. Pursuant to the merger agreement, the name of the Big Wedge Mining Company was changed to the Atok-Big Wedge Mining Company, and its capitalization was increased from P2,000,000 to P6,000,000. Stockholders of the Atok Gold Mining Company exchanged their shares for an equal number of shares in Atok-Big Wedge Mining Co., Inc.

Geology and Mineralization

In the Baguio gold mining district, sediments consisting of conglomerate, sandstone and shale, often metamorphosed, are intruded by bodies of diorite and andesite. In the Atok-Big Wedge area, a belt of sediments lies between the major diorite mass of the district on the east, and a large igneous mass consisting of andesite and diorite on the west. Both of these igneous masses are irregular in shape but trend roughly north-south. At some time after the sediments were laid down, they were folded; the major fold trending northwest-southeast, and plunging southeast. It is thought that the Keystone fault, which has been the main source of ore, originally occurred as a longitudinal fracture related to the major fold, and that several minor north dipping, northeast striking fractures were originally cross fractures related to the bending of the fold axis down to the southeast.

At a still much later time after the folding and formation of the above fractures, the belt of sediments were subjected to strong horizontal compression in an east-west direction. The active shove probably came from the east, and pushed the hard, competent diorite mass on the east toward the similar igneous mass on the west. This resulted in the squeezing of the sedimentary belt, with consequent shortening from east to west, and lengthening from north to south. Finding the Keystone fracture already in existence, the force from the east utilized it, shoving the ground northeast of this fracture to the northwest for at least 2,000 feet on the eastern end. Stress incident to this shoving of block past block tore open branch tension fissures striking east-west, in which ore was later deposited.

However, the large igneous mass on the west, lying across the path of this differential shoving of blocks to the northwest, resisted the ground movement along its eastern border, with the result that the fault movement diminished toward the northwest, and the Keystone fault

finally dissipates in that direction.

At some time there was a slight turning toward an east-west direction by the Keystone vein that localized the major ore body on it that occurs in Atok-Big Wedge Mining Company ground.

Mineralization in the Keystone vein and vicinity consists of fine grained free gold deposited in a gangue of mixed quartz and calcite, all varying over a wide range. Pyrite occurs in negligible quantities, and traces of chalcopyrite and bornite are sometimes seen. However, in prewar operations near the western boundary of the Company's claims (the Keystone vein is near the eastern boundary) copper minerals were present in substantial quantities in ore mined from the Broadway and Frank veins.

Shaft Below Adit Level

Entrance to the mine is through an adit that extends one mile from the portal to two counter shafts. One of these Shafts (No. 2) was sunk before the war and extends 700 feet below the adit level to Level 8.

The No. 3 Shaft was sunk after the war to replace the caved No. 1 Shaft. This shaft is of three compartments also—two for ore and the third for the manway, air and water, and power lines. The two hoisting compartments are equipped with double deck cages. This is the main shaft and is connected to the Keystone vein workings only on Levels 5, 7 and 10, which are the main haulage levels. Ore from other levels is either passed down to one of these levels or is hoisted through No. 2 Shaft. One Mancha Little Trammer battery locomotive on each of the above levels gathers and hauls ore cars to Shaft No. 3, while all tramping on other levels is done by hand.

All ore is hoisted in 18 cubic foot cars and dumped in pockets above Level 1, from which it is drawn into 30 cubic foot gable bottom cars and hauled to the mill coarse ore bins in trains of 20 cars each, pulled by one of two 7-ton Davenport Diesel locomotives.

Most of the waste broken in development and exploration headings is utilized for stope filling, but any excess that occurs is likewise hoisted and dumped in a separate pocket provided therefor, hauled outside and dumped.

Heavy Rainfall

Baguio is situated in a region of heavy rainfall, the annual average being approximately 175 inches.

Most of this occurs between June and September and at times interferes to a minor degree with normal operations. During the dry season approximately 1,000 gallons of water per minute drain out through the adit of Level 1; however, during the rainy season this quantity increases to approximately 5,000 gallons per minute generally. But when a typhoon passes near the vicinity, this quantity has reached the rate of 8,000 gallons per minute for a period of two or three days. At such times motor haulage is obstructed to some extent, but no milling time has as yet been lost because of it. Mine water flow below Level 1 is conducted out of the mine, by pre-war agreement, through the 700 Level Drainage Tunnel of the Benguet Consolidated Mining Company. Therefore, no pumping is necessary on or above Level 7. The only present pumping installation in the mine is located on Level 10 where three Byron-Jackson two stage centrifugal pumps, directly connected to 60 hp General Electric motors, are installed. During the dry season the water flow on Level 10 amounts to approximately 500 gallons per minute, while in the rainy season this increases to approximately 750 gallons, all of which is handled by two pumps, leaving one as a spare.

The two principal methods of stoping employed are top slice and horizontal cut and fill. These are conducted in the usual manner except that an exceptionally heavy, squeezing hanging wall severely restricts the length of stopes. Vein width varies from 5 to 50 feet, with the average being about 20 feet.

Top Slicing

In top slices, six post raises, consisting of manway and ore chute, are

driven on 60 foot centers. New floors are started by driving a gangway in ore along the footwall from one raise to another. A small slusher hoist and scraper are installed in this gangway after which successive slabbing cuts approximately five feet in width are taken toward the hanging wall side, and for the entire distance between the two raises. Before the last cut, or slab, is removed from the hanging wall, all previously broken ore is removed, and all but the last two rows of sills are laid for the next succeeding floor. When this is completed the remaining "scab" of ore is drilled, blasted and removed as quickly as possible, the additional sills and a thin layer of matting are placed, and the posts are drilled and blasted. Even working in this manner it is often necessary to place diagonal stulls with headboards against the hanging wall to hold it until the posts are blasted. Sills are round timbers, 8 to 10 inches in diameter on the small end, and 10 feet long; while the posts are also round timbers of the same diameter, but eight feet in length.

Cut and Fill Stopes

Raises for cut and fill stopes are also of the six post type, but are spaced on 30-foot centers, generally in the center of the vein. Because of the heavy hanging wall, stope lengths are restricted to 30 feet—15 on either side from the center of the raises. Ore breaking is started near the footwall and advanced toward the hanging wall as is done in top slicing. Due to the proximity of the single chute in the stope all broken ore is shovelled manually. The vein material is inclined to be blocky, consequently numerous stulls and head boards are used for tempo-

The thickeners are grouped on one floor of the mill.



rary support. As soon as a cut has been finished to the hanging wall, the plank flooring is removed, light gob fences are placed at the ends of the stope (across the strike), the chute and manway are raised, and filling from above is begun. This must be done as the squeezing hanging wall will not stand unsupported for a height of 14 feet, or two floors. Fill is placed within one foot of the back of the stope, and a new floor is opened in an adjacent stope. Actually in practice, breaking and filling in adjacent stopes are carried on simultaneously. When a new floor is opened, the stulls and head boards placed on the lower floor are reclaimed. This is done by placing a loop of small steel cable, or chain around the top or butt end of the stull and lifting it out of the fill with a 20 ton railroad type hand jack. After considerable tension has been placed on the cable or chain, several sharp blows on the side of the stull with an eight pound hammer loosens it sufficiently to permit its being lifted out for re-use. Stulls are round timbers, six to eight inches in diameter on the small end, and seven feet long. Cut and fill stopes are carried to within 20 to 30 feet of the level above, depending on the width of the vein. The pillars are mined by conventional square setting, with the use of round timbers. However, each floor is filled immediately after breaking and removal of ore.

Comparative stoping costs of top slices and cut and fill stopes are about equal. Higher tonnage per manshift is obtained in the top slices but this is largely offset by high timber costs, while in cut and fill stopes labor cost is high, due principally to spreading fill by hand, while timber cost is very low.

All underground workmen earn basic daily wages plus some form of efficiency bonus participation. Men working in stopes operate on a standard direct cost per ton basis,

while development work standards are based on direct cost per foot of advance in various classifications. This bonus, or incentive plan, results in an average increase in earnings of approximately 20 percent over the daily wage.

Free Milling Ore

The ore from the mine is free milling and readily lends itself to the extraction of gold. The accompanying flow sheet and legend show the lay-out of the milling plant and indicate the type of equipment used. The fine crusher was added in 1947 and resulted in increasing the daily capacity of the mill from slightly over 400 tons to 450 tons.

Table No. I
Atok-Big Wedge Costs for Mining and Milling
160,747 Tons of Gold Ore in 1950

Item	Dollars
Mining ¹	\$3.30
Milling	1.52
Marketing	.13
Gross production tax	.88
General overhead—mine	1.23
General overhead—Manila	.77
Total	\$7.83

¹ Including development in ore.

The crushing plant ordinarily operates two shifts per day; however, at times when the ore is particularly wet and sticky, continuous operation is required. Manganese steel wearing plates are used in the jaw crushers, with the average life of the movable jaws being 29,000 tons while that of the stationary jaws is 12,500 tons. The Gyraseph con-caves average 35,800 tons while the mantles average 34,500 tons. The vibrating screen covers are Tyler Ton-Cap 5133, which average 20,000 tons per cover.

Two Mills in Each Unit

The four ball mills are arranged in two units. Each unit consists of a primary mill in closed circuit with a Dorr rake classifier and a secondary mill in closed circuit with a

Dorr bowl classifier. The discharge pulp of the primary mills is run at 71.5 percent solids, while the primary classifiers overflow at 54 percent solids. The pulp discharge from the secondary mills average 76 percent solids; while the overflow of the bowl classifier is at 22.5 percent solids, giving a grind of approximately 70 percent minus-200-mesh. The average consumption of liners is 2.44 pounds per ton of ore and that of grinding balls 1.70 pounds per ton. All grinding is in cyanide solution. The strength of solution is maintained at 1.5 pounds of KCN and 0.40 pounds of CaO per ton at the primary agitators. Aero Brand Cyanide is used with consumption averaging 1.74 pounds per ton of ore. Commercial lime is added at the secondary ball mill feed, with consumption of 3.48 pounds per ton of ore milled. The eight agitators are arranged in the two units of four each. Each unit consists of one primary and three secondary agitators. 3.4 hours of agitation is given ahead of primary thickening. Secondary agitation is for 19.1 hours, thus giving a total of 22.5 hours of agitation.

The six thickeners are also arranged in two units, each consisting of one primary and two secondary, or washing, stages in counter-current. The primaries overflow to pregnant solution, with the underflow going to secondary agitation. About one third of the overflow from the secondaries goes to the primary thickeners to balance the precipitated tonnage, with the other two thirds to mill solution. From 500 to 600 tons of mill solution is added to each of the first washing thickeners and 400 tons of barren wash solution is added to each of the last two secondary thickeners.

The tailing is filtered by a Moore filter, with an average cycle of: 4 minutes forming cake, 20 minutes barren wash, and 3 minutes water wash. The total tail value, solids plus dissolved, averages 0.016 ounce gold per ton of ore.

Table No. II

Atok-Big Wedge Production in Tons, Value in Pesos Per Ton, Total Value of Production, Operating Cost in Dollars and Dividends Paid Per Share From 1936 to 1950.¹

Year	Tons Milled	Peso Per Ton Value of Gold Recovered	Total Value of Gold Recovered In Pesos	Operating Cost Per Ton In Dollars	Dividends In Centavos Paid Per 10 Centavos Par Value Share
1936 ^a	18,982	P31.29	P591,547.31	\$5.65	—
1937	42,166	32.92	1,388,978.68	8.11	1
1938	62,304	32.19	1,986,179.00	7.71	4
1939	75,313	26.46	1,969,995.71	6.65	6
1940	75,642	27.71	2,114,104.00	6.42	4
1941 ^b	98,044	40.94	3,930,897.40	6.25	8
1947 ^c	91,590	—	4,066,494.31 ^b	—	2
1948	147,997	—	5,771,188.30 ^b	—	10 plus 50% stock
1949	148,137	—	5,905,587.25 ^b	—	8
1950	160,747	—	5,272,667.72 ^b	7.83	4.5

¹ 1950 official legal exchange value of Peso is \$0.427. ^a 6 months. ^b 11 months. ^c 9.5 months. ^d Includes premium gold sales.

Power Plant

Power generating units installed in the power house are as follows:

Four 240 KW General Electric generators each driven by a D-5 Worthington Diesel engine.

One 282 KW General Electric generator driven by a DD-5 Worthington Diesel engine.

One 300 KW General Electric generator driven by a DH-6 Worthington Diesel engine.

Any five of the units can carry the

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normal load, leaving the sixth as a spare.

While operating costs show a definite trend upward due to rapid increase of cost of supplies and to additional concessions to labor, operating costs for 1950, before depreciation and depletion, are fairly uniform, and are given in Table No. 1.

Premium Gold Sales

Of considerable importance to the gold mining industry of the Philippines is the matter of premiums received for their gold. Under the Philippine laws, the companies must sell 25 percent of their gold output to the Government at the fixed price

of seventy-pesos (\$35.00) per ounce. The remaining 75 percent is sold in the free market much of it bringing 100-pesos to as high as 160-pesos per ounce. To illustrate the importance of this factor, it might be noted that based on the \$35.00 per ounce price, Atok's 1950 production has a valuation of P3,688,454.03 whereas the actual amount received for the year's production was P5,272,677.72.

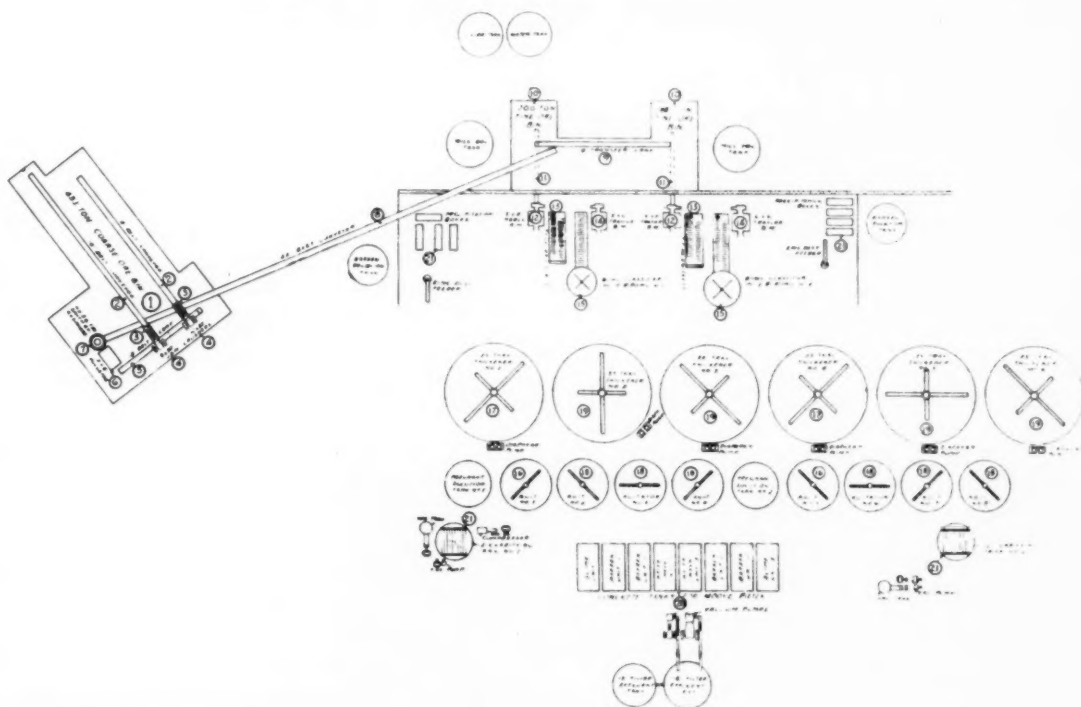
Shareholders

Shareholdings of Atok-Big Wedge are widespread. As of December, 1950, the 35,285,883 shares outstanding were held by 3,338 stockholders of which 1,290 were Filipinos, 1,538 Americans, 318 Chinese, 97 British,

33 Spanish and 62 of other nationalities.

Acknowledgment

Acknowledgement is made of my indebtedness to the Atok-Big Wedge Mining Company, Inc. and to its staff for their courtesy and co-operation in supplying the technical data of the operation and the geologic description of the Baguio district. Special assistance was given by: J. Amado Araneta, chairman; R. H. Canon, general superintendent; P. A. Schafer, geologist; G. R. Pohl, mine superintendent; B. Foust, mill superintendent; C. G. Tiglaio, chief engineer; R. Henry, assistant mine superintendent; and J. Crocker, assistant mill superintendent.*



FLOW SHEET OF THE BAGUIO MILL ATOK-BIG WEDGE MINING COMPANY, INC.

CRUSHING PLANT AND FINE ORE STORAGE

- 1 TWO COARSE ORE BINS. TOTAL CAPACITY 433 TONS.
- 2 TWO CONVEYORS WITH DINGS MAGNETIC HEAD PULLEYS.
- 3 TWO GRIZZLEYS SET WITH ONE-INCH OPENINGS.
- 4 TWO 10 BY 30 INCH TELSMITH JAW CRUSHERS. SET AT 1 1/2 INCHES.
- 5 ONE 18-INCH CONVEYOR-FEEDER TO SCREEN.
- 6 ONE 3 BY 8 FOOT TELSMITH SINGLE DECK SCREEN WITH 1/2-INCH OPENINGS. UNDERSIZE TO FINE ORE BINS. OVERSIZE TO GYRASPHERE CRUSHER.
- 7 ONE 36-INCH TELSMITH GYRASPHERE CRUSHER. OPENING SET AT 3/8 TO 1/2 INCH.
- 8 ONE 22-INCH CONVEYOR TO TRANSFER CONVEYOR.
- 9 ONE 18-INCH TRANSFER CONVEYOR TO FINE ORE BINS.
- 10 TWO FINE ORE BINS. TOTAL CAPACITY 428 TONS.
- 11 TWO 18-INCH CONVEYOR FEEDERS TO BALL MILLS.

GRINDING AND CLASSIFICATION

- 12 TWO PRIMARY BALL MILLS. ONE 5 BY 5 FOOT MARCY AND ONE 6 BY 5 FOOT TRAYLOR.
- 13 TWO DORR RAKE CLASSIFIERS IN CLOSED CIRCUIT WITH PRIMARY BALL MILLS. OVERFLOW TO BOWL CLASSIFIERS.
- 14 TWO REGRIND BALL MILLS. ONE 5 BY 6 TRAYLOR AND ONE 6 BY 6 TRAYLOR IN CLOSED CIRCUIT WITH BOWL CLASSIFIERS.
- 15 TWO DORR BOWL CLASSIFIERS. OVERFLOW TO PRIMARY AGITATION.

AGITATION AND THICKENING

- 16 TWO 18 BY 16 FOOT DORR AGITATORS FOR PRIMARY AGITATION. DISCHARGE TO PRIMARY THICKENERS.
- 17 TWO 12 BY 35 FOOT PRIMARY THICKENERS. OVERFLOW TO PREGNANT SOLUTION STORAGE. UNDERFLOW TO SECONDARY AGITATION.

- 18 SIX 18 BY 16 FOOT DORR AGITATORS FOR SECONDARY AGITATION. DISCHARGE TO SECONDARY THICKENERS.
- 19 FOUR 12 BY 35 FOOT DORR TRAY TYPE WASHING THICKENERS. TWO WASHING STAGES. MILL SOLUTION ADDED TO THE FIRST WASHING THICKENERS AND BARREL WASH SOLUTION ADDED TO THE SECOND (FINAL) WASHING THICKENERS. OVERFLOW TO MILL SOLUTION. UNDERFLOW TO FILTRATION.

FILTRATION AND PRECIPITATION

- 20 MOORE 160-LEAF FILTER. ALL FILTRATE TO MILL SOLUTION. FILTER CAKE SLICED DIRECTLY TO THE RIVER.
- 21 PRECIPITATION OF PREGNANT SOLUTION BY MERRILL-CROME SIMULTANEOUS CLARIFICATION AND PRECIPITATION PROCESS IN TWO UNITS OF 256 BAGS EACH.



A bulk nickel-copper concentrate is made by flotation. A total of 144 mechanical-type flotation machines are shown in the new mill.

INTERNATIONAL NICKEL CO.'S NEW CREIGHTON MILL AND 13th SHAFT NOW IN OPERATION

Simultaneous completion of two projects by the International Nickel Company of Canada, Limited—a new shaft and a new concentrator at its Creighton mine—will enable the company to maintain refined nickel production capacity at the present rate of about 250,000,000 pounds per year.

Now in full operation, the two projects are part of Inco's extensive program of underground mine development, in the Sudbury, Ontario district, launched during World War II in anticipation of the depletion of open pit surface ores which contributed substantially to nickel production during the war and since.

New Ore Hoisting Shaft

Sunk initially to a depth of 2,050 feet, the new No. 7 shaft at Creighton is the company's 13th operating shaft. Designed for ore-hoisting only, it is concrete-lined throughout and has two skip compartments separated by a manway and pipe compartment, an arrangement which allows the hoist to be set at a minimum distance from the shaft. The shaft is 8½ by 24 feet in cross section.

Serving No. 7 shaft is a 14 foot by 110 inch parallel, double-drum geared hoist driven by two 2,750-hp., 600-volt, 500-rpm., D.C. motors with rotating type control. The skips have a capacity of 15 tons each, and the hoisting ropes are two-inch flattened strand with a breaking strength of 380,000 pounds. Hoist operation is semi-automatic, with push-button control at the loading station. Hoisting capacity is 700 tons per hour.

Models Aid Mine Planning

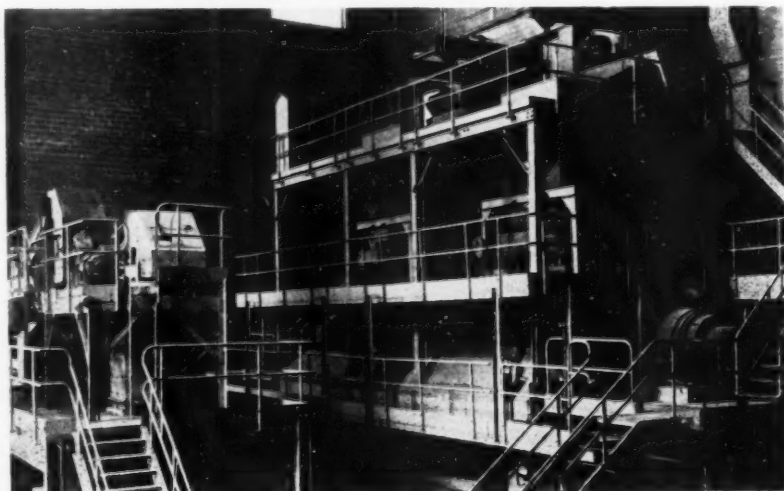
The problem of mining ores from the lower grade sections at Creighton was complicated by the fact that higher grade ores had previously been removed from the areas below the lower grade ores. Old mine workings interfered with an orderly arrangement of openings for the new program. This and many other problems were solved by using models built to scale and embodying the factors anticipated in actual underground mining.

Lower grade ore now being mined at Creighton flows by gravity to 28 level of No. 3 shaft, where huge crushers with openings of 4 by 5½ feet give it primary crushing. It is then dropped through a concrete-lined bin to 30 level, where it

is picked up by a conveyor and carried to an ore bin and loading station at No. 7 shaft, some 1,900 feet distant.

Extensive laboratory, pilot plant, and operational scale test work preceded designing of the new Creighton concentrator in 1948. Capacity of the mill was originally set at 6,000 tons, but, before construction was completed, changing world conditions made it essential that this be increased. Two weeks after the commencement of the Korean War plans were altered to bring the capacity up to 10,000 tons. Inco's engineering department achieved the difficult task of almost doubling the capacity of the mill while construction was in progress, and yet they managed to put the plant in

The new crushing plant. It forms an integral part of the headframe and ore from the mine is hoisted directly into the crushing plant.



operation ahead of schedule despite material shortages.

New Mill Serves Two Mines

Approximately one-quarter of the feed to the new mill is non-magnetic ore which is transported direct from Creighton's No. 5 shaft by a semi-enclosed system of three belt conveyors with a total length of 3,600 feet. The 30-inch belt has a speed of 400 feet per minute and a rated capacity of 650 tons per hour. The second of two transfer points in the conveyor system contains a 150-ton surge bin equipped with variable speed feeders to control the rate of feed to the receiving belt at the mill. The minus-2-inch ore from No. 5 shaft enters the mill circuit at the second stage of crushing.

Ore from the operations in No. 7 shaft receives its primary crushing underground and is hoisted to a 700-ton dump pocket. Secondary crushing plant has a simple straight-line flow sheet with no circulating loads. It is built at the site of No. 7 shaft; the headframe and hoist house are integral parts of the mill building, and ore from the mine is hoisted directly into the crushing plant. Chain feeders deliver and control the rate of feed to two parallel crushing circuits. The ore passes on to a scalping screen. The oversize is reduced in two crushers set in series, a seven-foot Standard and seven-foot heavy duty Short Head. A screen eliminates the undersize ahead of the Short Head crusher.

The reinforced concrete mill bin is divided into four sections, each of 5,000-ton capacity. A four-way tripper, operating on a conveyor belt which runs the full length of the bin, prevents segregation of coarse and fines in distributing the feed to the four sections of the bin. The ore is weighed and automatically sampled before entering the bin.

Each of the four units in the grinding circuit consists of two trunnion type overflow mills and one rake type classifier. One of the mills is charged with rods and the other with balls. Each mill, 10 feet 8 inches in diameter and 13 feet long, is powered by an 800-hp. synchronous motor and holds a 70-ton rod or ball charge.

The ore, drawn from the bin by variable speed roll feeders, is delivered to the rod mill of the grinding unit by means of a conveyor system. A scale automatically controls and registers the tonnage to the mill by regulating the speed of the roll feeders. Metered water to the grinding unit controls the grinding condition and, indirectly, the final size of the product. Crushed pulp

from the rod mill, which used rods up to 3½-inches in diameter, discharges into a sump and is pumped to the classifier, from which the sand flows by gravity to the ball mill. The ball mill discharge returns to the classifier. Overflow from the classifiers of the four grinding units is collected in a central sump and pumped to the flotation section.

Float A Bulk Concentrate

A bulk, rougher, concentrate ready for separation is produced by flotation. This is accomplished in 144 mechanical-type flotation cells arranged in six 24-cell banks. The flotation feed is delivered to a six-way distributor and then flows by gravity to each bank of cells. Flotation reagents are added to both the pump sumps and the cells, the reagent feeders and head tanks being conveniently located on a floor overlooking the entire flotation circuit.

The bulk concentrate is laundered into a sump from which it is pumped through an eight-inch wood stave line a distance of 7½ miles to the Cooper Cliff concentrator where it is separated into its final products of nickel or copper concentrates. There are five relay pumping stations in this unique operation. Sand removed from the flotation tailing is returned to the mine to be used as backfill.

Dust from the primary and secondary vibrating screens and the crushers is piped by a system of

ducts to a collecting unit which consists of 20 standard 34-inch conical dust-collecting cyclones through which air is drawn at the rate of 62,000 cubic feet per minute at 5-in. negative pressure. The dust is withdrawn from the bottom of the cyclones, pulped with water, and pumped to the flotation circuit.

Total metal input to the mill is determined through automatic sampling of the feed by two Vezin samplers followed by a roll crusher and a Snyder sampler. Samples of tailing are assayed every hour, samples of concentrate every two hours. Percent-solids and sizing analyses of the various mill pulps are made regularly for operating control. The mill is equipped with a completely modern sample room and laboratory.

Electricity And Water

Power for the 400-odd motors at the new mill is supplied from the company's 60-cycle distribution systems. Incoming power is at 44,000 volts and is transformed by a 15,000-kva transformer bank to 550 volts for use by the smaller motors. The motor control equipment is located centrally in switchrooms throughout the mill. Size of the motors varies from very small electric clock motors to the large 5,500-hp. synchronous motor driving the No. 7 shaft hoist. The plant's water supply is obtained through a six-mile pipeline from the Vermilion River.

A view of the grinding section in International Nickel's new Creighton mill.





Calera Mining Company's new Blackbird mill as seen from the mine office looking east down Blackbird Canyon. At left center the housing for the rotary car dump on the mine portal level can be seen. The Quonsets in the lower right are a part of the former mine camp.

"SWEAT, INGENUITY, DOLLARS" A NEW MINE FOR HOWE SOUND

The Calera Mining Company has carved a cobalt and copper producer from Idaho's Salmon National Forest—another example of Howe Sound pioneering

In the heart of Idaho's beautiful and primitive Salmon National Forest, the Howe Sound Company is producing cobalt and copper concentrates through the Blackbird division of its subsidiary Calera Mining Company.

Under the direction of Edwin B. Douglas, manager of the Blackbird division, the difficult and costly preparations of the Blackbird mine and mill are rapidly being completed to give the United States a more

secure position in world cobalt production. The history of the Blackbird property began before the turn of the century with gold recovery from ore taken out of 1,400 feet of development workings. Until 1943, however, when Howe Sound became interested, activities in the area were limited to surface exploration and a few unsuccessful attempts to produce gold, copper, and cobalt economically. The failure of these attempts can be attributed largely

to the extremely difficult conditions under which operations must be carried out and to the absence in every case of sufficient capital expenditures.

Successful Pioneers

Howe Sound has generally concentrated its geographically widespread mining operations on a single type of property—a large-tonnage, low-grade ore occurrence in an isolated and undeveloped area. The Snow Lake region in Manitoba and the Lake Chelan area in Washington presented problems in transportation and operation considered so nearly insurmountable as to preclude profitable mining. Howe Sound stepped in with its know-how and capital to develop two of its most successful properties. The company's success in such operations can be attributed to three factors: (1) continual exploration by a competent and experienced staff, (2) the fearless application of large initial investments to properties recommended by their investigating engineers and geologists, and (3) a company policy toward personnel that promotes a feeling of responsibility and achievement and thus attracts and retains a technically proficient staff.

The two men below, Mill Superintendent Oliver Hower and Mill Foreman Kenneth Hill, are responsible for control and operation of the new concentrator.



Another Triumph

The Blackbird mine and mill is an excellent example of a Howe Sound property. It represents the best in modern pioneering—geographically, geologically, and metallurgically. The area around the Blackbird is considered to be one of the most primitive in the United States; the ore occurrence presents a vein system that is vastly complex; and until Howe Sound's metallurgists completed their exhaustive research, no successful method of concentrating cobalt from the Blackbird ore was known.

The primitive area of the Salmon National Forest where the Blackbird is located presents a rugged facade of deep, narrow gorges and steep, timbered mountain slopes in many places denuded by quartzite talus. When Howe Sound entered the area to begin their extensive examinations, the few existing roads were, at best, mountain trails open only during element weather. These roads have been improved by the company in conjunction with the United States Forest Service maintenance program. All-weather travel is now possible to and from the towns of Salmon, 42 miles east of the mine, and Challis, 54 miles south. The latter road, used to truck concentrates to the road-to-rail transfer point at Mackay, 107 miles south of the mine, is soon to be gravel-surfaced as a second-class highway.

A New Town is Built

The living quarters supplied by the company have expanded from the first tents and Quonset huts at the head of Blackbird canyon to a

completely modern village, now officially named Cobalt. A level, narrow valley floor at the junction of Panther Creek and Deep Creek nine miles east of the mine was chosen as the permanent townsite. Housing facilities for the staff have been furnished by the company. A plan of advancing money for building materials and skilled labor, long followed by Howe Sound on other operations, is available to permanent employees.

Geology Complex

The Blackbird veins, or perhaps more properly "pods," present a confusingly complex structure. Upon completion of the diamond drilling programs carried on separately by the United States Bureau of Mines and Howe Sound, the ore was found to occur in pod-shaped shoots that individually plunge steeply to the north and have an echelon formation running northwestward. The cobaltite (CoAsS), chalcopyrite (CuFeS_2), pyrrhotite ($\text{Fe}_{11}\text{S}_{12}$), and pyrite (FeS_2) found in the district is considered to be the result of replacement of the enclosing block of folded Belt Series schists. The Blackbird deposit is divided into two major ore zones—the Chicago and the Brown Bear. Mineralization appears to be continuous between the two zones though they differ slightly in tenor and character.

Ore Zones Developed

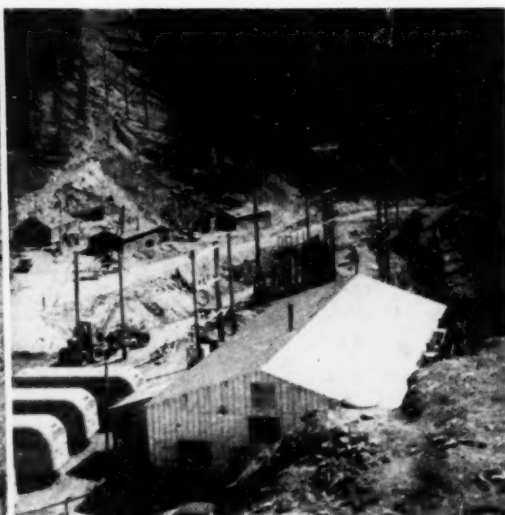
Development has followed the general strike of the echelon formation and over 18,000 feet of drifting and cross-cutting and 2,000 feet of raises and shafts give access to

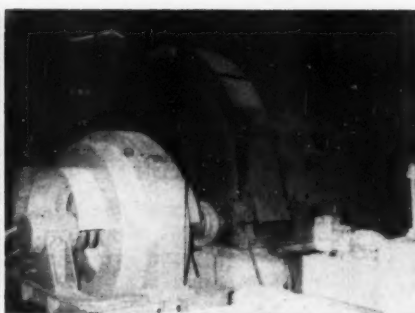
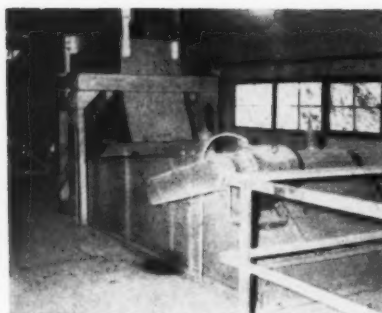


Ward Carithers, chief geologist, and the mine model of the Brown Bear ore zone he constructed from the data resulting from surface exploration, diamond drilling, and underground development at the Blackbird.

the mineralized zones. Ore, mined by horizontal cuts, is trammed from the mine thru a 6,000-foot main haulage adit. The portal, on the north side of Blackbird Canyon, is at an elevation of 6,850 feet. Due to the relatively weak walls, plans call for close backfill of all stopes with a coarse mill tail fraction. Mining is carried to assay walls and constant sampling is required.

LEFT: The crusher house, dry and change house, and office building as seen from the Blackbird mill looking up the canyon. RIGHT: The compressor house, sub-station, and power line that services the mine and mill. The power line, brought across the Continental Divide from Ban-nock, Montana, by the Idaho Power Company, has single spans of nearly a mile in length. The buses in the lower left furnish transportation for the employees between the mine and the town of Cobalt, nine miles down the canyon.





LEFT: The conveyor and rod deck that feed the ore to the secondary cone crusher from the primary jaw crusher. CENTER: The rod mill shown here is the preliminary grinder from which the ore is fed to the ball mills, one of which is seen in the left background. RIGHT: This view shows the tray thickener (in the background) and the agitator, looking from the upper deck of the mill where the rod and ball mills are located.



LEFT: The three banks of flotation cells in this picture are to be extended toward the foreground to allow for the expansion of the mill from its present 600-ton capacity to 1,000-tons. CENTER: R. S. Arbuckle is here attending the Denver thickener used to deslime the cobalt concentrate and the Dorr thickener used for the copper concentrate. RIGHT: This two-disc filter handles the final cobalt concentrate, now being stockpiled awaiting completion of Calera's new cobalt refinery at Garfield, Utah.

New Milling Method

Considerable experimentation was carried on by the USBM and Howe Sound to formulate a milling procedure that would economically recover a suitable cobalt concentrate. The staff metallurgists at the Blackbird mine research laboratory discovered that a cobalt concentrate

could be made by long conditioning with lime at high temperature. This discovery finally made possible the profitable flotation of the Blackbird ore. The method developed requires no roasting, formerly considered necessary for efficient concentration of cobalt sulphide ores. A small pilot mill was built to test and improve the methods of recovery. On

the basis of the operation of this mill and further laboratory experiments, a full-scale mill was designed. Original plans called for a mill of 600 tons per day and this section has been completed. The design was changed, however, to enlarge the mill to 1,000 tons by the addition of a second ball mill and extension of the flotation sections. Work on the plant enlargement is now being carried on and is scheduled for completion in March, 1952. The mill is built in two sections. The crusher house is on the north side of the canyon near the mine portal and the mill proper on the south side.

Dump Ore Tests Mill Circuit

Since June of 1951, the mill has been in operation on a one shift basis running dump material mixed with minor amounts of development ore. Though of a highly oxidized nature, the dump material has yielded cobalt and copper concentrates, proving the practicability of the mill circuit.

Lime and Heat Conditions Pulp

The mill heads are fed to the crusher house at the mine portal

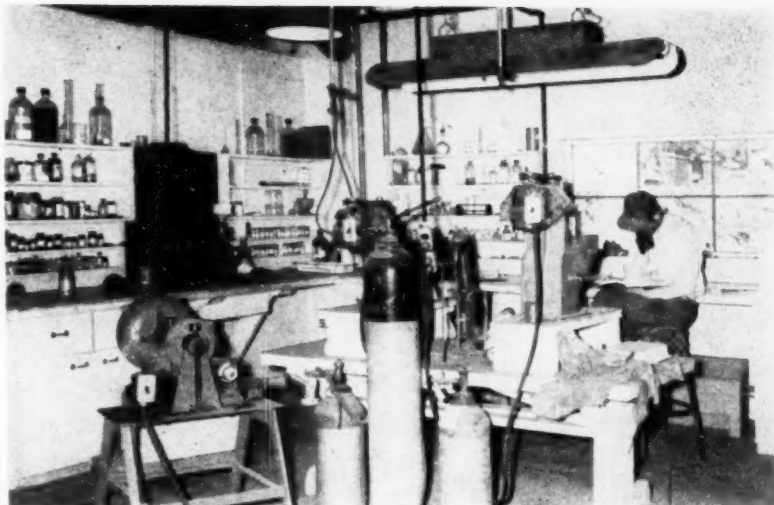
Chief Engineer Cecil J. Whitley and Engineer Al Newman are discussing claim surveys in the Blackbird engineering office.



level through a 500-ton crude ore bin to be equipped with a rotary car dump. After being crushed to minus-3-inches by an 18 by 36 inch primary jaw crusher, the ore is fed to a rod deck screen which allows the minus- $\frac{3}{4}$ -inch fraction to bypass the four-foot shorthead secondary cone crusher set a $\frac{3}{4}$ of an inch. From the crusher plant, a belt conveyor system brings the ore across Blackbird Canyon to a 550-ton fine ore bin and thence, by vibrating feeder and conveyor, to a 7 by 12 foot rod mill for preliminary fine grinding. As the ore is fed to the rod mill, lime is introduced as the first step of the special conditioning process. The mill circuit splits after leaving the rod mill to be ground to 65 percent minus-200-mesh by two 8 by 9 foot ball mills operating in closed circuit with two mechanical classifiers. The pulp density of the ground product issuing from the classifiers is raised by a tray thickener. At this point the material is heated to 90° F. by the introduction of hot water from two 80-hp. boilers as the second step of the special conditioning process. After agitation and introduction of reagents 208 and iso butyl carbnal, for collection and frothing, the pulp is fed to the first of the three banks of Agitair flotation cells for copper concentration. The concentrate issuing from the cleaner cells in the copper circuit is dewatered by a thickener and a three-disc filter and transferred to the copper concentrate bin to await shipment to a custom smelter at Garfield, Utah.

Mill Tail Sand Used in Mine

The tailing from the copper circuit is sent to the second bank of flotation cells for iron concentra-



The research laboratory at the Blackbird mill where much of the work was done that made cobalt concentration a reality.

tion. Reagents Z-6, 404, and iso butyl carbnal are added at the head of the iron circuit as collector, promoter, and frother, respectively. The iron concentrate from the cleaner cells is mixed with the mill tailing, deslimed by a 12-inch Dorrelone, and stored in sand tanks to await use in the mine as stope filling. The slime is transferred thru a 6-inch concrete pipe to the tailing dam on West Fork, $3\frac{1}{2}$ miles down Blackbird valley at the junction of West Fork and Blackbird Creek.

Acid Circuit for Cobalt

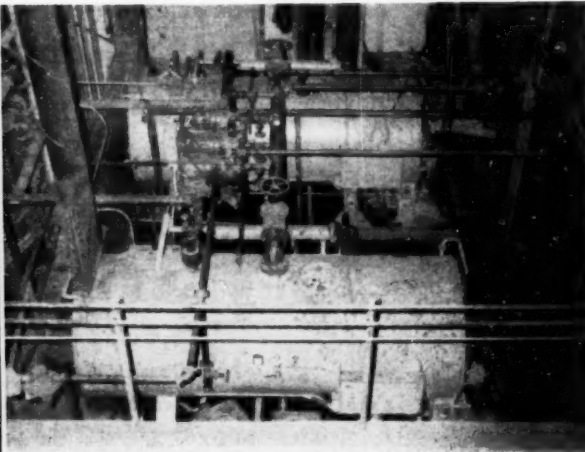
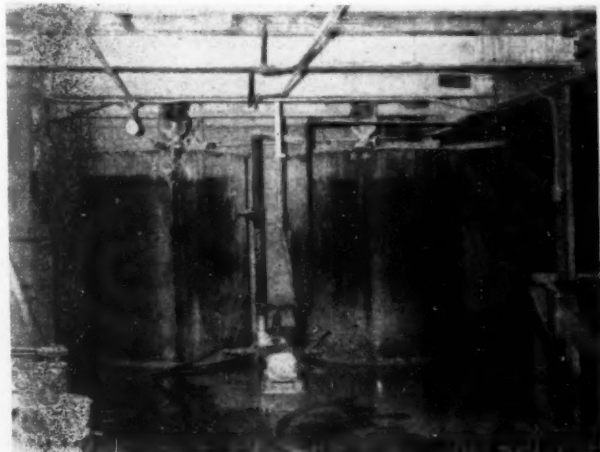
Up to this point the pulp is kept basic. Since an acid circuit is required for efficient cobalt concentration, sulfuric acid is introduced ahead of the cobalt section to lower the pH. The pulp is further readied for cobalt floatation by the addition of Na₂S.

Z-6, and pine oil as sulfidizer, collector and frother. The cobalt concentrates are dewatered by a thickener and a two-disc filter and stored to await shipment to the Howe Sound refinery now building at Garfield, Utah.

"Sweat, Ingenuity, Dollars"

In the words of Edwin B. Douglas, "Through the courage of many men working intermittently over a period of more than half a century plus the expenditure of millions of dollars, a domestic supply of an essential strategic metal will be provided. To make a mine requires time, sweat, ingenuity, dollars, and above all, incentive." In making the Blackbird a profitable new mining enterprise, Howe Sound's staff have applied the foregoing factors with diligence.

The lime preparation tanks and the 80-hp. boilers for pulp heating. The lime and heat used to condition the pulp are the keys to Calera's cobalt concentration.



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MINING WORLD

Muriel Sibell Wolle Describes

CRIPPLE CREEK BOOM

Cripple Creek sprang up in the early nineties in cattle country. Gold was first discovered in 1874 by T. H. Lowe, one of Hayden's surveying corps, who picked up rich float on a meadow near the present site of the city and, becoming excited over his discovery, organized a prospecting party to examine all the nearby gulches. Not enough gold was found to warrant mining and the area was forgotten for 10 years.

In the spring of 1884 a new gold strike was reported. Chicken Bill, a prospector, was taking nuggets out of the ground by the fistful. To help him, over 3,000 men started on a dead run for the slopes of Mt. Pisgah (west of Cripple Creek), where the excitement centered. By night the whole region was covered by stakes, but no outcroppings were found nor any evidence of mineral except from one shallow hole. Even the hole was an old one having been dug by some previous prospector. The dirt from it was as "barren of gold as a Missouri cornfield." The hole had been salted! When the hoax was discovered everyone started looking for Chicken Bill but he had vanished.

After this, men were suspicious of new discoveries in the region, fearing another trick.

William W. Womack came to Colorado from Kentucky in 1876 and filed on a homestead where Cripple Creek now stands. In 1884 he sold his land to a cattle company and they in turn sold it the following year to the cattle firm of Bennett and Myers. Bob Womack, the son of the original owner, rode this range during the eighties and was always on the lookout for pieces of float in hope that they might contain gold. He took his best specimens to Colorado Springs but no one paid any attention to his discoveries. Finally he staked a claim which he called the Chance, and proceeded to work it for six years without bothering to record it. In December 1890 he got E. M. De la Vergne and F. F. Frisbee sufficiently interested in his gold samples to go with him to the pasture land and see for themselves. After inspecting his shaft in Poverty Gulch, they too began to prospect and soon

afterwards located the El Dorado lode. By the summer of 1891 Womack had found good float that assayed \$25.00 to the ton and several days later, when he struck the vein, he hurried to Colorado Springs to celebrate. In his drunken excitement he disposed of his mine, which he had relocated as the El Paso, for \$500.00 in cash. As soon as his discovery became known men flocked to the cattle land and began staking claims all over an area six miles square.

Tents and cabins were erected on the site of the present city and a mining district was organized in the fall of 1891. Bennett and Myers, having discovered that gold was being found on their land, platted 80 acres for a townsite, called it Fremont, and began to sell lots like hot cakes. Other names were proposed for the camp but E. M. De la Vergne suggested Cripple Creek, which by its selection christened not only the embryo city but a whole era in Colorado's mining history.

The year 1892 was called the "year of expectancy." Most of the mining was from placers and had it not been for them the camp might have failed, for the great lodes were not discovered until 1893. Two stage lines carried people to and from the camp

and the population quickly rose to 4,000. The first newspaper was called the *Cripple Creek Crusher* and its first issue was printed in gold ink! The *Cripple Creek Prospector*, later the *Morning Times*, became the paper of the camp. Even when its plant was destroyed by fire, not an issue was missed for the editor sent the forms for each edition to Victor, six miles away, until a job press could be rigged up in the still smoking city. During the winter of 1892 the brokers arrived and sold shares of stock with amazing rapidity. Mining companies were organized by the hundreds and the entire country was staked for miles around.

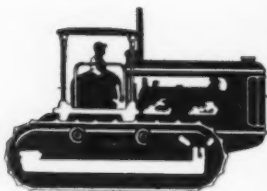
During 1893, the big mines were discovered and developed and after the demonetization of silver, thousands of miners who were thrown out of work by the closing down of the silver camps, flocked to Cripple Creek to dig for gold. The mines of the district were located on many hills—Gold, Globe, Tenderfoot, Mineral, Carbonate, Frink, Raven, Ironclad and Beacon and on Battle, Big Bull, Squaw, Grouse and Straub mountains.

By 1900 the year's production was \$23,000,000. The Colorado Short Line,

Continued on page 85

Cripple Creek's Bennett Avenue with the two-story traffic levels on the steep hillside.





CARROLL TRACK ROLLERS

Stay

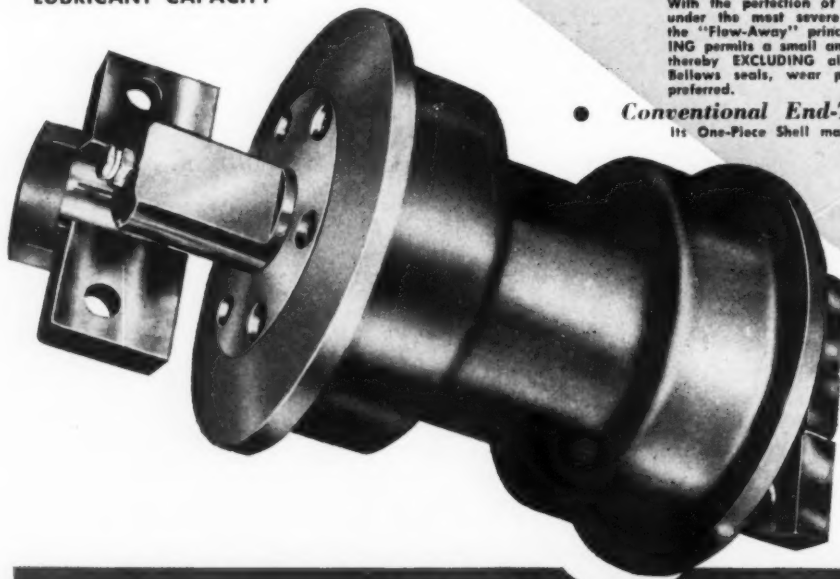
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ACTIVITIES OF U. S. MINING MEN

J. D. McAuliffe has joined the M. A. Hanna Company at their Michigan iron mining operations as general operating engineer with headquarters at Iron River, Michigan. Mr. McAuliffe was formerly with Falconbridge Nickel Mines, Ltd., at Sudbury, Ontario, Canada. **Roger Swindle** and **Theodore Brey** are new additions to the engineering department at Iron River. **Walter Barthiaume** of Crosby, Minnesota, has been retired from his job as engineer at the Portsmouth iron mine on the Cuyuna iron range.



DR. JAMES BOYD has resigned as director of the U. S. Bureau of Mines to take an executive position with the Kennecott Copper Corporation with headquarters in New York, New York. The Australian-born, 48-year-old geologic engineer is the second graduate of the Colorado School of Mines to become a Kennecott executive. Starting in Washington as captain in the Army in 1941, his rapid rise to colonel during the war years was eclipsed by his appointment as director of the Bureau of Mines by his good friend and then Secretary of the Interior, Julius Krug, in 1947. Boyd's successful fight for senate confirmation despite the public objections of John L. Lewis was aided by the nation's mining industry. Under his direction, the Bureau was reorganized along military lines and several new "chiefs" of divisions were created and moved to Washington.

G. C. Stuart is the new joint superintendent of the Chicago & Northwestern Railway and the Soo Line traffic on the Ashland division, which includes the Gogebic iron range.

Dr. John C. Warner, president of Carnegie Institute of Technology, has been elected a director of the Jones & Laughlin Steel Corporation, replacing **Walter H. Dupka** who has retired.

Philippe Boulon, Ingenieur des Mines de France, of the Lorraine iron ore district, recently visited the iron ranges in Michigan and Minnesota. He was accompanied by **M. E. Henry** of the Institut de Recherches de la Siderurgie in Paris.

James Singleton has joined the mining engineering staff of Bonita Mining and Developing Company, Inc., at Silverton, Colorado.

William Bourne Wood is now employed as a mining engineer at the Empire, Nevada plant of the U. S. Gypsum Company. He formerly was at the University of Nevada at Reno.

F. W. Lease resigned from Day Mines, Inc., to become foreman of the Sun Valley Lead-Silver Mines' Blue Kitten mine, near Ketchum, Idaho. **Herman Stamer** is the mill foreman at Sun Valley's concentrator.

John Anderson, formerly mill superintendent at the Ima property of the Bradley Mining Company near Patterson, Idaho, has been transferred as mill foreman to the 2,400-ton concentrator operated by Bradley at Stibnite, Idaho. **Garnet McCall** is the new mill superintendent at Ima.

H. A. Kursell, resident mining engineer and consulting engineer to the mining department of American Smelting and Refining Company, has retired after 26 years. He is planning to go into private consulting practice.

Roland I. Erickson has accepted a position as Professor of Mining at the University of North Dakota at Grand Forks. He had been chief engineer and assistant superintendent of the Reserve Mining Company at Babbitt, Minnesota.

W. W. Little assumed the position of mine superintendent of the Copper Queen Branch, Phelps Dodge Corporation, Bisbee, Arizona, on October 1. Little has been general superintendent of the corporation's United Verde Branch at Jerome for the last year, previously serving as mine superintendent. He joined the Phelps Dodge organization at Bisbee in 1937, but in 1940 entered the armed services. On his discharge he returned to Bisbee and was made assistant mine superintendent, a position he held until his transfer to the United Verde Branch in 1948. He is a graduate of the Colorado School of Mines. **H. D. Clark** has been made mine superintendent of the United Verde Branch. He will be in charge of all operations at Jerome and at Clarkdale, Arizona. During recent years Clark has been employed at the Copper Queen Branch at Bisbee as a mining engineer.

Harry B. Sharpe, acting director of the National Production Authority's Miscellaneous Metals and Minerals Division, presided at the organizational meeting of the Kyanite and Mullite Industry Advisory Committee. Among the members attending were **Gene Dixon** of Kyanite Mining Corporation, Cullen, Virginia; **A. E. Fitzgerald** of the Research Department of General Refractories Company, Philadelphia, Pennsylvania; **Charles W. Fyfe** of Seaboard Refractories Company, Perth Amboy, New Jersey; **Henry A. Golwynne** of The Mullite Refractories Company, Shelton, Connecticut; and **C. E. Hawke** of The Carborundum Company, Perth Amboy, New Jersey.

Leonard J. Harris, mining engineer of Pickands Mather & Company in the Iron River district, Michigan, has resigned to accept a position as city manager of Stambaugh, Michigan.

R. K. Poul of Hubbell, Michigan, has been made superintendent of Calumet & Hecla Consolidated Copper Company's smelter, mill, and reclamation plant.

Helmar C. Johnson has taken charge of the Monticello uranium mill operated by the Galigher Company of Salt Lake City for the U. S. Atomic Energy Commission. Mr. Johnson, formerly superintendent of the Vermont copper mill, will replace **A. C. Ensign** who will continue on as a consultant for the company.

Willard P. Fuller, Jr., is now geologist for the Original-Sixteen-To-One mine at Alleghany, California. He formerly was resident geologist for Anaconda Copper Mining Company's properties in the Tintic, Utah district.

Anthony Sutich of Rapid City, South Dakota, has been added to the engineering department of the Pacific Isle Mining Company, Hibbing, Minnesota.

James E. Hogle has been named chairman of the board of Rico Argentine Mining Company, Salt Lake City, Utah. He had previously served as business manager, and earlier as assistant general manager. He has also been named a director.

John Q. St. Clair, mining geologist, has opened a temporary office at 300 Builders Exchange, Duluth, Minnesota, for the winter.

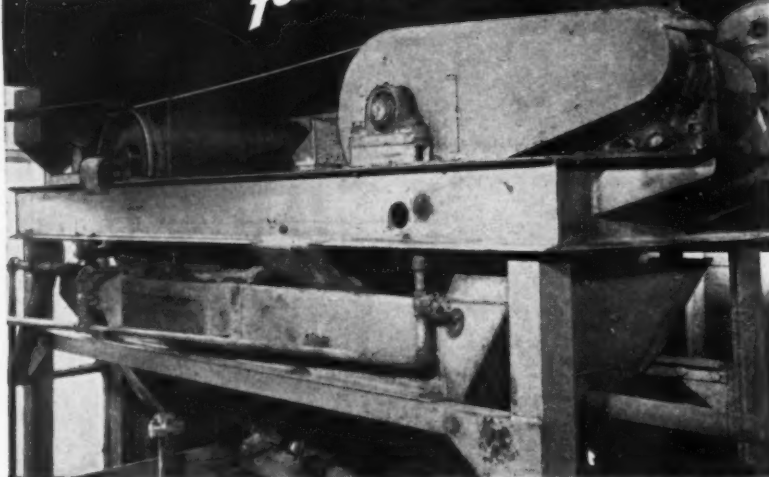
Ronald B. Pearson, formerly assistant chief engineer of the Cleveland-Cliffs Iron Company's Mesaba district, has been promoted to the position of superintendent of the Canisteo mine at Coleraine, Minnesota. **Giulio Giuliani**, who had been acting superintendent of the Wanless-Woodbridge mine, has now been named superintendent.

Dr. Donald H. McLaughlin, president of the Homestake Mining Company, is chairman of the gold price committee formed by the Mining and Metallurgical Society of America to consider what would be a fair price for gold, measured in terms of paper currency. **Arthur Notman**, consulting engineer, is secretary. Other members are **Kenneth C. Brownell**, president of American Smelting and Refining Company; **Wilbur Judson**, vice president of Texas Gulf Sulphur Company; **J. C. Kinnear**, vice president of Kennecott Copper Corporation; **Carl O. Lindberg**, American representative for New Consolidated Gold Fields of South Africa, Ltd.; **Alexander J. McNab**, president of Magna Copper Corporation; **Paul D. Merica**, executive vice president of International Nickel Company of Canada, Ltd.; **George Mixer**, executive vice president of U. S. Smelting, Refining & Mining Company; and **Heath Steele**, vice president of American Metal Company, Ltd.



T. W. MERRILL has been appointed chief metallurgical engineer of the Vanadium Corporation of America and has been transferred from the company's plant at Bridgeville, Pennsylvania, to their executive offices in New York City. He was with the United States Steel Corporation for several years before joining the Vanadium Corporation at Bridgeville as a metallurgist, where he worked on problems relating to the steel industry. In 1949, Mr. Merrill was appointed metallurgical engineer, in which capacity he served until his present promotion.

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Harold J. Christy of Wakefield, Michigan, has been transferred from the Jones & Laughlin Ore Company's Vicar mine now closed down, to the company's Tracy mine at Negaunee where he will be assistant superintendent. Donald S. Skufca of Ely, Minnesota, is a new member of the company's engineering department at Negaunee.

Pat Boileu has joined the M. A. Hanna Company's engineering staff at Iron River, Michigan, as an engineer at the Bengaltully mine. Ernest Soderberg has been appointed an engineer at the Wauseana mine.

Edward F. Johnson has been appointed foreman at the Oliver Iron Mining Company's eastern district concentration plant at Virginia, Minnesota, while Kenneth McInnis has been named superintendent of the Canton mine at Biwabik. Ian L. Reid has been transferred from the Virginia offices where he was assistant chief engineer, to the Duluth offices of the company as a geologist. Norman A. Moberg has been named supervisor of the general mining engineering division. He has been a mining engineer in the Duluth offices since 1946 and had previously served with the company in Hibbing and at Ishpeming, Michigan. Ralph W. Marsden, formerly a member of the faculties at the Universities of Wisconsin and Oklahoma and who also worked in the Philippines for the U. S. Bureau of Mines, has joined the engineering staff of Oliver at Duluth.

Donald C. Kimball of Stockton, Utah has joined the engineering force of Oglebay, Norton & Company at their Duluth office.

Major General Thomas F. Farrell, deputy administrator of the Defense Production Administration, has been appointed assistant general manager for manufacturing of the U. S. Atomic Energy Commission. General Farrell is on military leave from his post as chairman of the New York Housing Authority, and is on military assignment to the AEC from the Army. His responsibilities in his new post include the management of all atomic energy work concerned with getting supplies of uranium and other raw materials, the processing of feed materials for the production plants at Oak Ridge, Savannah River, Hanford, and Paducah, the operation of the production plants, and the construction of new production facilities.

Alexander H. Jeffries of the National Production Authority's Miscellaneous Metals and Minerals Division presided at a meeting of government officials with the Custom Raw Mica Fabricators Industry Advisory Committee to discuss U. S. requirements for mica. Among those attending were M. C. Faraci, American Mica Works, Newark, New Jersey; J. Fuller Brown, Asheville Mica Company, Newport News, Virginia; Ellery H. Farnam, Farnam Manufacturing Company, Inc., Asheville, North Carolina; J. F. Bufalino, The Huse-Liberty Mica Company, Boston, Massachusetts; N. J. Bottie, Industrial Mica Corporation, Brooklyn, New York; H. A. Knight, Sr., Mica and Minerals Company, High Point, North Carolina; M. A. Chapman, Mica Insulator Company, Schenectady, New York; Glenn L. Powers, Perfection Mica Company, Chicago, Illinois; Peter J. Yannello, Reliance Mica Company, Inc., Brooklyn, New York; S. A. Montague, Spruce Pine Mica Company, Spruce Pine, North Carolina; Samule Vance, Tar Heel Mica Company, Plumtree, North Carolina.

MINING WORLD

ACTIVITIES OF INTERNATIONAL MINING MEN



DR. WILLIAM B. MATHER, chairman of mineral technology at Southwest Research Institute, San Antonio, Texas, has been granted leave of absence by the Institute at the request of the U. S. State Department to participate in an economic mission to Brazil. Dr. Mather will be the mission's advisor in the field of mineral resources and research. During his absence, John Funnell, supervisor of ceramic engineering at the Institute, will direct the mineralogical work.

C. E. McManus has been appointed manager of mines for the Iron Ore Company of Canada, presently developing the Labrador-Quebec iron ore deposits. His field headquarters will be at Knob Lake, Quebec. Mr. McManus started work on the Mesaba range in 1934 with Butler Brothers. He was superintendent of operations on the Cuyuna range and then chief engineer before he left Butler to accept a position as superintendent of the Clifton mine in New York for the Hanna Coal and Ore Corporation. He was transferred back to Minnesota in 1948 as district superintendent of Hanna's operations on the Mesaba range, and in 1949 became assistant to the general manager of Minnesota Mines. Hanna holds an interest in the Iron Ore Company of Canada.

H. W. Worner, senior research officer of the C.S.I.R.O. working in the Baillieu Laboratory, Melbourne University, Melbourne, Australia, has been awarded the Syme prize (Research) for 1951. This award was made for original research work on the production of titanium and the constitution and properties of some of its alloys.

Robert C. Lancaster has been made chairman of Bestwood, Fraser and Weir, Ltd., a new international coal mining engineering field with offices in Chicago, London, and Johannesburg. Mr. Lancaster is managing director of the Bestwood Company Ltd. of Nottingham, England, and a vice president of the Paul Weir Company in the United States. Directors of the new firm include **Hugh Fraser**, managing director of H. H. Fraser and Associates (PTY) Ltd., **Sir Eric Young**, well-known mining engineer, and **Paul Weir**, president of the Paul Weir Company.

Charles E. Lively has been appointed assistant general superintendent of mines for the International Nickel Company of Canada. He had been superintendent of Levack since 1942, and prior to that had held the same position at the Garson mine. Before coming to Garson, Mr. Lively had been assistant superintendent of the Creighton mine. The new town of Lively between Copper Cliff and Creighton was named in his honor. **F. M. McAttee**, assistant superintendent of Frood-Stobie, will succeed Mr. Lively.

Dr. Hubert G. Schenck will be named Chief of the United States Economic Cooperation Administration's mission to For-

mosa, it was announced by ECA Acting Administrator **Richard M. Bissell, Jr.** Dr. Schenck, presently on active military duty as chief of the Natural Resources Section in General Headquarters of the Supreme Commander of the Allied Powers in Japan, has traveled widely in the Far East and was formerly a Professor of Geology at Stanford University.

George Scholey, mining engineer, of Tucson, Arizona is making an extended tour of the gold mining operations in Colombia and El Salvador. Before the war, he was vice president and general manager of Lepanto Consolidated mines in the Philippine Islands. Following his release from a Japanese prison camp at war's end, he engaged in gold mining in Colombia.

E. Frankel (Hochschild), **C. L. Kemper (Aramayo)**, **P. Espana (Banco Minero)**, and **R. Zumelzu (Medium Minera)** represented Bolivian tin producers at meetings in the United States with officials of the Reconstruction Finance Corporation to adjust the tin price which RFC would pay to Bolivian firms.

E. H. Louw, South African Minister of Economic Affairs, attended the meeting of Commonwealth Ministers in London in September. **John Dugdale**, Minister of State for Colonial Affairs, represented the Colonies.

E. M. F. Fergusson, chairman of the Straits Trading Company and a member of the Legislative Council, represented Malaya at the International Tin Study Group in Rome. Other Malayan delegates were **J. D. Mead** and **H. S. Lee**, members of the Federal Legislative Council.

Dr. Olof H. R. Odman, a geologist for the Geological Survey of Sweden, has been in the United States studying modern prospecting methods, grading of ores, and inventory methods. His six-week study trip was sponsored by the Economic Cooperation Administration under its productivity and technical assistance program.



ALLEN H. ENGELHARDT (left) is the new manager of operations of the Cerro de Pasco Corporation and will be in charge of the corporation's mining, smelting, and refining operations in Peru. Mr. Engelhardt has been assistant manager of operations since January of this year. Immediately prior to that time, he was with the South American Development Company as vice president and resident manager of that company's operations in Ecuador. **JOHN W. HANLEY** (right), superintendent of smelters and refineries of Cerro since 1949, has been appointed assistant manager of operations succeeding Mr. Engelhardt.



GEORGE F. STANLEY, metallurgical engineer for the Union Corporation Limited, Johannesburg, Transvaal, Union of South Africa, has been on an extended tour in the United States and Canada. The tour has been financed by funds provided by a



scholarship to study theory and basic principles of commutation. Among the plants and firms he visited were the Morenci, Arizona, operations of Phelps Dodge Corporation, the Carlton mill of the Golden Cycle Corporation at Cripple Creek, Colorado, the Trail and Chapman Camp operations of the Consolidated Mining and Smelting Company of Canada in British Columbia, and eastern Canadian gold mines. Immediately before his trip he was mill superintendent for the Zwartkop chrome mine, Transvaal, and he has wide experience in gold milling on the eastern Rand, including work at the Geduld mine. On his return to Africa, Mr. Stanley expects to be assigned to one of the Union Corporation's Rand or Orange Free State metallurgical plants.

Jack W. Clark, formerly of the United States Bureau of Mines, has been retained by Beryllium Development, Inc., a mining subsidiary of The Beryllium Corporation, as consultant in the development of beryl mining. This will include the mining of beryl in all parts of the world. Mr. Clark is presently making a survey of the entire beryl mining picture and Beryllium Development, or its parent company, The Beryllium Corporation, will be pleased to receive any inquiries on beryl ore addressed to their home offices, P.O. Box 1462, Reading, Pennsylvania.

Raymond Beard is now sub-general manager of Patino Mines and Enterprises Consolidated at Catavi, Bolivia, and **Sybertus Broersma** is general surface superintendent.

B. R. Pickering is now with the Mines Department, Dar-el-Salaam, Tanganyika Territory. He had attended the University of Otago at Dunedin, New Zealand.

B. G. Skelton is now director of Motapa Gold Mining Company, Ltd. of Bulawayo, Southern Rhodesia, replacing **E. Tullock** who retired.

M. Ralphs has been made general manager of Henderson's Transvaal Estates, Ltd., Johannesburg, South Africa.

R. Allen Griffin, director of the United States Economic Cooperation Administration Far East Program Division, has been designated as ECA representative on an inter-agency committee requested by Defense Mobilizer **Charles E. Wilson**. The committee will seek means to exploit the unused industrial capacity of Japan in the defense program of the free world. **George Artamonoff** has been named director of the ECA field office in Tokyo. Until recently, he had been deputy director of the Export Control Division of ECA's European office in Paris.

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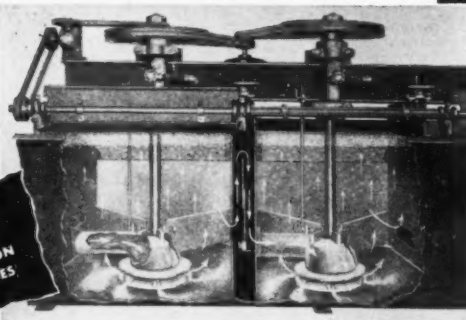
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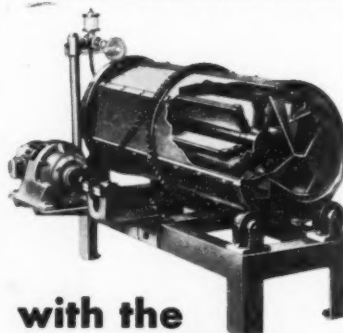
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INTERNATIONAL NEWS

O'Okiep Copper Output Hits Record High

A record high in production was reached by O'Okiep Copper Company for the fiscal year ending June 30, 1951. Net earnings totaled \$5,721,946, or \$5.60 a capital share, as compared with \$2,871,371, or \$2.81 a share for the previous year.

Production of blister copper from the company's property in the Union of South Africa reached 45,414,000 pounds for 1951, compared with 44,606,000 pounds in 1950. Total metal sales, priced at the mine, amounted to \$12,920,965 this year, against \$7,321,110 in 1950.

The company is reported to be one of the world's lowest cost copper producers on a per pound basis. The price received for copper during 1951 was 24.83 cents a pound, against 17.11 cents a pound in the previous year. The rise is said to be due to higher prices in Europe where most of the copper was sold, and to the deterioration of world currencies, reflecting world-wide inflation.

Ore reserves totaled 15,390,000 tons, averaging 2.55 percent copper to the ton as of June 30, 1951. A year ago, reserves amounted to 13,512,000 tons, averaging 2.61 percent copper to the ton. Extensive development and exploration are said to account for this increase.

The Newmont Mining Corporation owns 575,103 shares, 56.3 percent of the outstanding shares, in O'Okiep. Newmont's share in the company was valued at \$9,201,648 on December 31, 1949, and \$20,703,708 on June 30, 1951.

Labrador-Quebec Railway Speeds Up Work Schedule

Construction of the new Quebec North Shore & Labrador Railway, to be used to transport iron ore to Seven Islands, Quebec, from Knob Lake on the Labrador-Quebec border, is proceeding on a new working schedule which speeds the completion of the project by one year. The new schedule calls for grading of 120 miles of the line this year and track laying of 150 miles by the end of 1952. Rail laying has reached the Moisie River where the only large bridge (460-feet long) on the route is being erected. It is expected to be finished before severe winter weather sets in.

Another part of the Iron Ore Company of Canada's over-all plan for development of the Labrador-Quebec field is the construction of power plants. One, to be shared with Gulf Pulp and Paper Company, will be located on the Marguerite River and will provide 15,000 horse power. It will be used to operate the ore-handling terminal at Seven Islands.

Mine power will come from the Menihek Rapids site where a coffer dam is now being built, prior to building of the dam itself. The plant will have an initial capacity of 10,000 horsepower and will ultimately be capable of generating 40,000 horsepower. Provision will be made in the power house for installation

of a second unit at any time. Tentative plans now are to proceed with the second unit as soon as production has started.

Construction of the ore-loading terminal at Seven Islands is well-advanced, as is that for ore-handling equipment which is planned to receive and to store up to 70,000 tons of ore a day. Ships will be loaded at the rate of 8,000 tons an hour. Ore will be handled either directly to the ships as trains arrive or will be distributed in the yard according to grade and reclaimed by big shovels as needed. Completion of the shipping facilities is expected by 1954.

Close-spaced drill holes are being drilled in the iron orebodies to get ore outlines for the laying out of pit operations. Three 100-foot shafts have been sunk to examine rock structure. Stripping probably will not begin for another year.

The 10,000,000-ton production figure may be reached in 1955. This is expected to be only a minimum estimate, which may steadily increase, depending upon demands from the steel companies. Hanna Coal and Ore Corporation has allocated ore to Bethlehem Steel Company for future delivery.

IMC Allocates Copper and Zinc For Fourth Quarter

The International Materials Conference meeting in Washington, D.C. has announced the following copper and zinc allocations for the fourth quarter of 1951 (in metric tons).

FOURTH QUARTER ALLOCATIONS

Country	Total Copper	Total Zinc
Argentina	2,060	2,200
Australia	8,940	13,010
Austria	2,370	1,750
Belgo-Lux. Econ. Union	16,480	23,160
Brazil	3,090	1,940
Canada	27,580	12,780
Chile	2,310	1,020
Denmark	3,530	1,500
Egypt	1,230	300
Finland	2,430	1,020
Formosa	170	
France	36,490	27,660
French Africa	1,650	160
Germany	47,100	38,520
Greece	620	200
India	8,570	5,600
Ireland	40	80
Israel	55	80
Italy	24,200	9,390
Japan	13,200	10,530
Mexico	3,510	2,620
Netherlands	6,800	5,850
New Zealand	25	300
Norway	3,310	3,190
Pakistan	1,650	200
Peru	200	290
Philippines		20
Portugal	620	220
South Africa	4,170	3,100
Spain	3,710	4,020
Sweden	13,710	5,670
Switzerland	5,570	2,250
Turkey	1,360	20
United Kingdom	91,690	60,250
United States	333,770	228,460
Yugoslavia	4,950	1,900
Totals	667,160	496,260

Actually, these are more nearly voluntary agreements on limitations of use by each country. The allocations give

the amount of primary metal which each country will process or consume, either from mine production or imports, but do not specify from what sources or what prices are to be paid to secure the metals.

Cockatoo Island Ships Iron Ore to Australia

The first shipment of iron ore from Australia's large deposits on Cockatoo Island, off the northwest coast of Western Australia, has arrived at Port Kembla, New South Wales. This follows 24 years of development work carried out on the island at a cost of well over £1,000,000 (\$2,224,000).

Estimated at between 20,000,000 and 25,000,000 tons, experts say that the deposit is one of the richest in the world. It is a high-grade hematite, averaging 60 percent iron, but low in manganese. It is believed that a mixture of this ore with that obtained from the Iron Monarch mine in Southern Australia, will provide the ideal blast furnace charge.

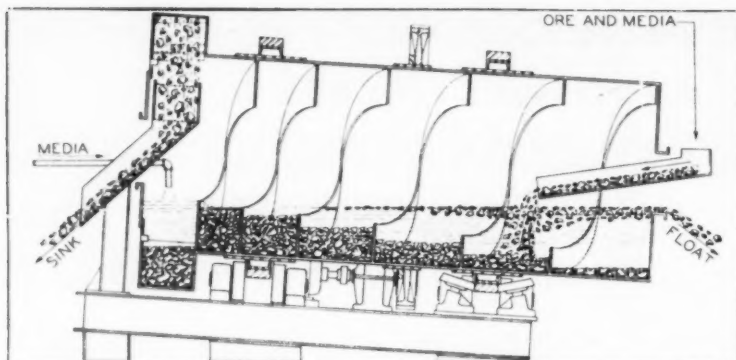
The orebody crops out along part of the southern cliff-face of the island, making open-cut methods possible. Four cubic-yard electric shovels load the ore blasted down from the working face into Diesel trucks for transport to the crushing plant at the eastern end of the orebody.

Loading the ore into ships is more difficult because of a 35-foot tidal rise. Special equipment had to be designed. A long boom now carries the final conveyor belt from the crushing plant out over the ship's hatch. The boom is hinged to swing up and down with the tide, while safeguards are provided against any sudden rise or fall of the ship.

Limited shipping facilities will delay maximum output from the island for some time. Ultimately, it is expected that a million tons a year will be produced. Three ore carriers have been built by Broken Hill Pty. Company, Limited, to haul the ore 3,000 miles around Cape York to the steel plants of Newcastle and Port Kembla—the "Iron Yampi," the "Iron Derby," and "Iron Kimberley"; a fourth, the "Iron Whyalla," is being built now.

Chile Rejects IMC Plan For Copper Allocation

The Chilean government has rejected the proposal of the International Materials Conference that IMC be allowed to allocate all of Chile's copper production for world distribution. Finance Minister German Pico Canas has announced that the government will continue to offer one-fifth of the country's copper production to non-communist markets at the best price obtainable. It is estimated that this amounts to about 80,000 tons a year, valued at about \$50,000,000. Under Chilean regulations, all mining companies are required to sell one-fifth of their output to the government.



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The Hardinge Counter-Current Heavy-Media Separator is a new separating device now in successful operation on the Mesabi Iron Range. It is a revolving, inclined, cylindrical drum with spiral flights on the inner surface of the cylinder. The material to be separated and heavy media is fed in at the lower end. As the drum rotates, the "sink" is carried to the high end. The "float" overflows a circular weir at the lower end.

There are no internal moving parts to grind against each other. Thus, maintenance is extremely low. Media to fill this circuit is considerably less than with a cone of equal capacity. The separator will handle large pieces of ore—up to 4 inches—and can be started under full load. Write for Bulletin 39-B-3.

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CEYLON—Britain is to get all of Ceylon's thorium output. A processing plant loaned by the United Kingdom has been installed in Katukurunda, 30 miles south of Colombo on the west coast of the island, where monazite sands are found in abundance. The plant has gone into production and all of its output will be sold to Britain. Monazite is invariably found in the black sands along the west coast of Ceylon—the beach at Induruwa near Katukurunda containing the most concentrated deposits. Another deposit has been discovered at Kodremalai, 40 miles south of Mannar.

JAPAN—Reconstruction of Japan's gold mining industry began with the reopening of the Konomai mine in Hokkaido by the Besshi Mining Company, the Mochikoshi mine in Shizuoka Prefecture by the Chugai Mining Company, and the Kushikino mine in Kagoshima Prefecture by the Kamioka Mining Company. The Yamagano mine of the Yamagano Mining Company, Ltd., in Kagoshima Prefecture, which has been constructing a 130-ton flotation plant, began its operations on July 1 after a two-month trial period. Estimated ore reserves amount to 816,000 tons containing seven grains of gold and 21 grains of silver per ton.

INDIA—Plans are being made to collect sillimanite which occurs at a number of places in the northwestern portion of Nongstoin in the Khais Hills, Assam. Investigation has revealed that sillimanite is available in 21 localities in the Khais Hills. According to official sources, the majority of deposits contain massive sillimanite with little corundum. These deposits are said to be unfavorably situated in inaccessible areas. The main drawback for their development is the lack of transportation facilities.

BURMA—Burmese rebels have seized three years' output of wolframite—a vital raw material for the steel industry—from the British-owned Mawchi mines at Mawchi. With the mining center in the hands of the rebels since 1948, the wolframite has not been moved. The concentrates have piled up until now they are valued at several million rupees. The Mawchi mines normally produce about 10 percent of the world's wolframite.

INDIA—Pyrite deposits have been discovered in the southern hilly tracts of Bombay state, extending over twelve miles in Kalga Village in the coastal district of Karwar. The expected yield is about 10,000 tons per month, containing almost 4,000 tons of sulphur. This would supply the sulphuric acid plants in the country at nearly full capacity.

JAPAN—Negotiations are under way with India for Japan to import 500,000 tons of iron ore annually.

INDIA—Extensive deposits of ilmenite sands found in Ratnagiri district in Bombay may afford India a stronger position in titanium output. At present, India produces annually a little over 200,000 tons of ilmenite, almost all coming from Travancore in South India. According to geologists and prospectors, the ilmenite sands found are of high quality and contain up to 50 percent TiO₂. Exploitation will begin immediately and, to start with, about 1,500 tons will be available for export. The prospectors hope to increase the output of ilmenite to 5,000 tons a month by 1952. Experts believe that

INTERNATIONAL

India can develop her ilmenite production to 500,000 tons if there is sufficient demand.

JAPAN—*Santo Shoji KK*, a Japanese trading company, is reported to have contracted to import 2,500 tons of chrome ore from the Philippines.

INDIA—A scheme for developing zinc deposits in Nepal, at a cost of two crores of rupees, is to begin shortly, when 25 geologists start prospecting in the hills of Tipling, ten miles northeast of Khatmandu. The project will be undertaken by the *Himalayan Syndicate*, political conditions permitting. The syndicate proposes to subscribe 50 percent of the share capital necessary for the venture and will provide 300,000 rupees immediately for the prospecting operations. A preliminary survey conducted by the Nepal government's *Bureau of Mines* indicates the existence of a good grade of ore in an area near Tipling. Present plans are to convey the ore by an aerial tramway from the mines to a processing plant in Nepal, and then to ship the concentrates from Nepal to a smelter to be set up for final treatment. The companies expect the project to take three years, and when finished to supply India with enough zinc for her own needs with a sizable surplus for export. The government of India has appointed a committee to consider a suitable location for a zinc smelting plant in India. Among other things, it will recommend steps to assess resources of zinc ores at Zawar in Rajputana and other places in India.



AFRICA

MOROCCO—A beryl deposit at Tiznit in the extreme south has attracted the attention of French prospectors and engineers.

ALGERIA—The output of antimony in 1951 will exceed the 1,090 tons of 1937. Algeria is now reported to be the tenth world producer of zinc, 13,000 tons per year, more than that of France and Argentina combined, which was 12,200 tons, and of South Africa with 11,500 tons.

SOUTH AFRICA—The reduction plant at *Welkom* gold mine has started making metallurgical tests to determine the characteristics of the ground to be treated. It is expected that these tests will be continued until the mine is ready for actual gold production by the end of the year. In addition to being useful as a guide for ore dressing, the tests will also ensure that the plant is in full working order by the time full scale gold production is reached. Development is at present from both shafts at the mine; by the end of July more than 50,000 feet had been accomplished. Development rock from both these shafts is being used for the tests.

MADAGASCAR—The French government has authorized the sale of 7,200 metric tons of graphite and 500 metric tons of phlogopite mica to the United States. Both products are produced in Madagascar. Yearly output of mica from Madagascar amounts to 600 tons of splittings and blocks. It will be exported to the U.S. through the port of Fort Dauphin, while the graphite will come through Tamatave.

NIGERIA—Plant operations were suspended for some time at the property of the *Naraguta Extended Areas, Ltd.*, in the province of Bauchi, Nigeria, when two pipelines which crossed the Delimi River were broken, flooding the plant.

FRENCH EQUATORIAL AFRICA—Lead production during 1950 reached 3,489 tons, nearly double that of 1949 but less than that mined in 1947. Rising prices have stimulated prospecting but labor shortages and transportation difficulties are limiting factors. During 1950, 1,552 tons of zinc ore were mined, and 1,688 kilograms of columbite-tantalite.

GOLD COAST—New directors of the *Nanua Gold Mines* are trying to raise money to carry on mine operations. An appeal has been made for £40,000 in the form of unsecured, non-interest-bearing loans repayable six months after demand. A severe labor shortage, coupled with delays in completing the mill, have put the company six months behind schedule. During this time, mine expenditure has been running at about £15,000 per month. To pay off existing current liabilities and to keep the mine running for another month (September), or alternately to provide the necessary money to put the mine on a care and maintenance basis would call for about £40,000.

SOUTH AFRICA—*Star Diamonds (Pty.) Ltd.* reports that during the period from June 1 to August 31, 1951, 13,933 loads were treated at the mine; 3,930.75 carats were recovered; the realized value was £41,875; and the estimated profit was £21,120.

SOUTH AFRICA—A deflection of borehole L.R.7, situated on the farm La Riviera 289, a short distance to the north of the *Harmony Gold Mining Company* area, has given a value on Basal Reef equivalent to 2,154 inch-dwt. This result, following the intersection announced by *New Consolidated, Free State, Exploration Company*, which showed an assay equivalent to 911 inch-dwt., indicates that another mine will be opened up in the Free State. The bore hole is being drilled jointly by *New Consolidated* and *Middle Witwatersrand Ltd.* who have an agreement to prospect the area. If the new mine is opened, *New Consolidated* will probably work it.

FRENCH EQUATORIAL AFRICA—A credit of Frs.251m (£256,000) will be granted to *Union Miniere Africaine* by the *United States Economic Cooperation Administration*. The Franco-American firm plans to exploit alluvial diamond deposits discovered on the border of the Labay River in Oubangui. Diamond production in French Equatorial Africa decreased by 11,468 carats in 1950, compared with the 1949 total of 122,928 carats. The reason given by mining sources is that rich deposits are exhausted, labor is scarce, and diamond thefts have increased.

GOLD COAST—The working conditions in Gold Coast mines will be investigated by a new commission set up by the *Legislative Assembly*. Anthony Woode, former general secretary of T.U.C., proposed the motion. He was largely responsible for organizing strikers during the general strike in 1950. The motion was seconded by another trade union official, and opposed by a representative of the *Gold Coast Chamber of Mines* who said that one inquiry had already taken place in 1948 and that the Mineworkers' Union had not requested such an inquiry.

SOUTH AFRICA—*Middle Witwatersrand, Ltd.* has announced the results obtained in bore holes VDH5 and VDH6. VDH5 is situated about 1,000 feet northeast of bore hole VDH1 on the common boundary of the farms Van den Heeverstrust No. 419 and Spes Bona No. 921. At a bore hole depth of 5,574 feet, the "A" Reef was intersected, assaying 4.53 dwt. over a corrected width of 118.2 inches, equivalent to 535 inch-dwt. At a bore hole depth of 5,819 feet, the "B" Reef was



BOMI HILLS DEPOSIT IN LIBERIA

This picture was taken from the top of the 120-foot high, Bomi Hills iron-ore outcrop in Liberia by a member of the *Mining World* staff in June. At the lower left, overburden is being excavated to provide a face of massive magnetite for future extraction. The slope at the right, partially concealed by jungle, is littered with 5,000,000 tons of float which is now being shipped to the United States.

INTERNATIONAL

intersected, assaying 19.46 dwt. over a corrected width of 19.6 inches (381 inch-dwt.). At a bore hole depth of 6,427 feet, the Basal Reef was intersected, assaying 127.8 dwt. over a corrected width of 24.5 inches (3,131 inch-dwt.). Core recovery was nearly complete and deflections will be made to obtain second intersections of these horizons. On bore hole VDH6, located about 4,500 feet south-south-east of bore hole VDH1, on the common boundary of the farms Van den Heeverst No. 419 and Rosedale No. 898, a conglomerate band was intersected at a bore hole depth of 4,343 feet. This assayed at 18.47 dwt. over a corrected width of 20.3 inches, equivalent to 375 inch-dwt. At a bore hole depth of 4,349 feet, another conglomerate band was intersected assaying 8.73 dwt. over a corrected width of 34.8 inches, equivalent to 304 inch-dwt. Drilling is continuing. Both bore holes are being drilled jointly with *General Exploration Orange Free State, Ltd.*

BELGIAN CONGO—The *Comite Na-*

tional Du Kivu is developing some tin deposits in the eastern part of its concession. Production of tin is continuing from several mining concerns operating in the western section.

UGANDA—Development of the copper-cobalt orebody at Kilembe in Western Uganda continues with favorable results. Local reports indicate that the deposit may be as important as some in Northern Rhodesia. More than 350 natives are now employed at the property. Future plans may include the building of a railroad from Kampala (on the northern shore of Lake Victoria) westward to the mine. Under discussion is the future treatment of the concentrate at Jinja, utilizing power to be developed at Owen's Falls at the outlet of Lake Victoria.

UGANDA—Increasing interest in tungsten production is evident, due to the greater demand. Normal production of about 200 tons of concentrate per year can be increased by more vigorous mining activity.

SOUTH AFRICA—Platinum dividends have been sharply increased, a reflection of the completion of the first stage of *Rustenburg Platinum Mines'* expansion program. *Potgietersrust Platinum, Waterval Platinum, and Union Platinum*, all of which are holding companies, are increasing their capital to finance the second stage of expansion of the operating company, *Rustenburg Platinum*, which plans to double its output.

BELGIAN CONGO—The *Syndicat de Recherches Minières du Bas et du Moyen Congo (BAMOCO)*, which was formed by the *Union Minière du Haut Katanga*, the *Forminière* and other companies of the *Société Générale de Belgique*, is drilling, prospecting, and starting experimental mining of copper ores near Madunda in the lower Congo.



OCEANIA

QUEENSLAND—A fire at the *Tableland Tin Dredging* plant at Mount Garnet caused damages totaling £A70,000. Most of the workshops building was destroyed, along with £A5,000 worth of reserve supplies and valuable machinery. Because much of the equipment will be hard to replace, Australia's tin shortage may be accentuated.

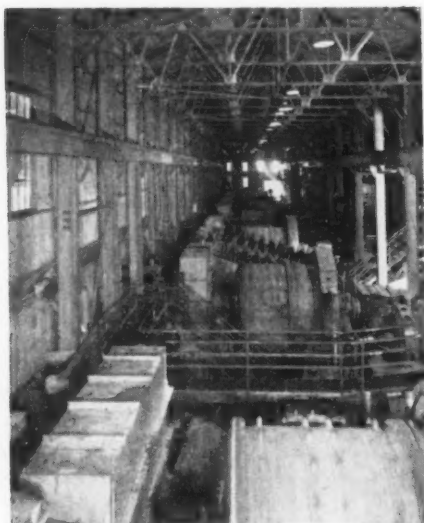
WESTERN AUSTRALIA—The orebody being mined by *Mount Charlotte (Kalgoorlie) Gold Mines Ltd.* decreased in grade as the company mined deeper. This mine, therefore, is on a care and maintenance basis. The ore is now of marginal grade and the economic rate of production would be 35,000 tons per month.

NEW GUINEA—During June, July and August of this year *Bulolo Gold Dredging, Limited*, dredged 2,605,570 yards to recover 16,867 ounces of fine gold. During the same period in 1950, the company dredged 3,082,200 yards to recover 13,666 ounces. The No. 5 dredge is expected to be back in operation by late December or early January.

NEW SOUTH WALES—*New Occidental Gold Mines N.L.* at Cobar has been treating an increased tonnage of lower grade ore from the *New Occidental* mine. A four-percent increase in tonnage to 96,900 tons yielded about 15 percent less gold (25,000 ounces). Its *Chesney* mine treated 52,900 tons for 3,000 ounces of gold and 788 tons of copper during the first half of 1951.

VICTORIA—German competition is being felt by British mining machinery manufacturers throughout the Commonwealth. In Australia, the *State Electricity Commission* of Victoria has ordered two, 1,100-ton, bucket-wheel dredgers from *Stalbau Rheinhausen, Rheinhausen, West Germany*, at a price of £A600,000. Each dredger has 10 buckets mounted on a large wheel, is electrically powered, and is mounted on nine-foot-wide caterpillar tracks.

PHILIPPINES—*Mindanao Mother Lode Lines, Inc.* handled 10,700 tons of ore during August for a return of \$168,714. This compares with 9,500 tons handled during the same month last year for recovery of \$176,637.



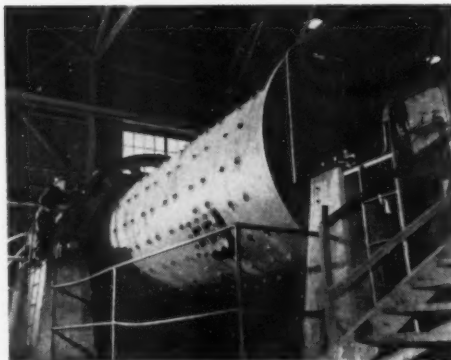
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WESTERN AUSTRALIA—The *Wheal Ellen* lead mine about 30 miles from Geraldton has been found to contain zinc, as well as lead, both in the mine and dumps. *Corderoy Mines, Ltd.*, which owns the Wheal Ellen reports that production is expected to start within a year.

NORTHERN TERRITORY—One of the biggest mining booms in Australian history is reported to be under way in the Northern Territory. New valuable fields are being found and old workings opened up. New towns are going up and government crushing batteries are working full time to keep pace with the large amounts of ore streaming in from prospectors. Valuable finds of wolframite, copper and tin are reported from the Pine Creek area where 20 new leases were granted last month and more will be opened up soon. In the year ended June 30th, mining production of gold, wolframite, mica, copper, and tin amounted to £A886,139—a quarter higher than the previous year. This year's "take" is expected to amount to around £A1,250,000.

TASMANIA—*Electrolytic Zinc Company of Australia, Ltd.*, at Risdon near Hobart, produced 77,529 long tons of zinc for the year ended June 30, 1951. The company's west coast mines treated 159,429 long tons of ore and recovered 10,084 tons lead concentrate, 46,153 tons of zinc concentrate, and 3,781 tons of copper concentrate. This is comparable with the tonnages of the previous year.

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VICTORIA—Activities at *Cheuton Gold Mines N.L.* are reported to be winding up. A new shaft has disclosed that payable values at the bottom level of the old shaft do not continue in depth.

SOUTH AUSTRALIA—A new company, *Nairne Pyrites Ltd.*, will be formed to develop deposits of pyrites at Nairne, South Australia. Proposed production of the field is 360,000 tons of ore per year, from which 36,000 tons of sulphur will be obtained. The cost of the plant to treat the ore, for which plans are nearing completion, is estimated at £A1,000,000 (\$2,240,000).

TASMANIA—*Montana Silver Lead, N.L.* has developed a six-foot wide lode of rich ore over a 68-foot length.

NEW GUINEA—Fresh interest in gold around the Edie Creek area is evident. A new company, *Eldorado Consolidated (New Guinea) Options Company N.L.*, is being formed in Melbourne.



EUROPE

NETHERLANDS—An all-time high in exports of iron and steel to the United States was reached in May when 19,861 tons valued at 5,294,000 guilders (\$1,400,000) were shipped. May shipments of tin, Holland's principal export item to the U.S., weighed 1,456 tons and amounted to 17,878,000 guilders (\$4,700,000). The *Ymuiden Blast Furnaces & Steel Company* reported a record net profit in 1950 of 4,686,000 guilders (\$1,243,684), compared with 2,869,000 guilders (\$755,000) the previous year. New records may be set as the company plans to raise its steel output from 300,000 tons annually to 570,000 tons. A new company, *N. V. Breedband*, has been organized which may provide urgently needed thin steel plates. Work on the plant has already started. Tin plate will also be manufactured.

ITALY—The *Assessorato for Industry and Commerce* is completing an overall plan for mining research. It has concluded an agreement with the newly established *Centro Sperimentale per l'Industria Mineraria* which will prospect for potassium salts in central Sicily, and for metals in the Peloritani Mountains of northern Sicily.

BELGIUM—Metallurgical exports to the U.S. in 1951 have far exceeded those of any previous year. Average monthly shipments in 1949 were 9,000,000 francs, rising to 30,000,000 in 1950, 152,000,000 during the first quarter of 1951, and 118,000,000 during the second quarter.

ENGLAND—Hopes are being entertained in London that the bullion market there, the world's largest before the war, might be reopened as a result of the International Monetary Fund's decision to allow countries to decide for themselves on how they will sell "semi-manufactured" gold. At present "free" gold in South Africa is selling in quite substantial quantities at \$40.00 an ounce. On September's production for this market the industry will amount to about £665,000 against a monthly average for

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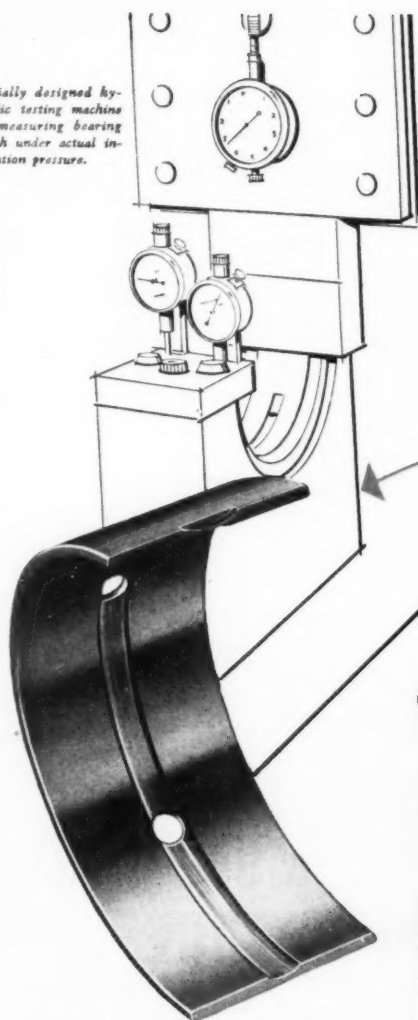
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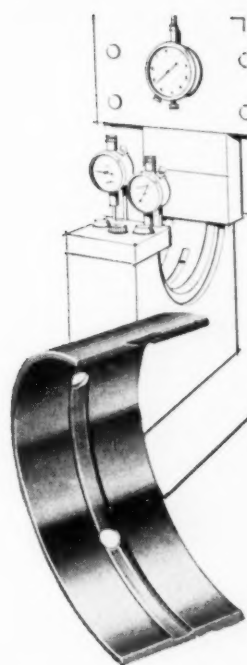
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INTERNATIONAL

£643,000 in the June quarter. No decision on the reopening of the London market is expected until after the General Election.

CZECHOSLOVAKIA—A new industrial combine is under construction in Kosice and Presov in Eastern Slovakia. Local ore and lignite deposits will be used, and initial operation is scheduled for 1953. By 1953, Czechoslovakia also hopes to triple the original goal set for iron ore production by the current Five-Year Plan.

YUGOSLAVIA—The *Zenica* steel works is reported to be nearing completion with the final deliveries made on foreign equipment. When in full production next year, the plant expects to double present rolling mill production in the country.

YUGOSLAVIA—Mining output during the first half of 1951 was as follows: iron ores, 315,000 tons; copper ores, 450,000 tons; lead ores, 315,560; zinc ores, 423,750 tons; chrome ores, 35,150 tons.

ITALY—A new refractory plant which will produce aluminum silicate refractories and will have a capacity of 25 tons a day, has been opened at Castellamonte near Turin. The plant is owned by the *Gres-Ceramiche Company*, a subsidiary of the *Cogne* which is, in turn, a government-owned steel concern.

BULGARIA—A copper deposit has been discovered south of Plovdiv which, according to the Bulgarian Minister for Industry and Commerce, could ensure an output of 5,000 tons of ore yearly

for a period of 15 years. A state mining company will be organized to exploit the area.

NORWAY—At the request of A./S. *Norsk Bergverk*, the *Norwegian Nitrogen Company* will build the necessary installations at the columbium mines of Holla, in Telemark Province.

PORTUGAL—The export of wolframite ore from Portugal is now liable to an export duty of four escudos per kilo and a surtax of 36 escudos per kilo. This actually amounts to a splitting of the export duty on wolframite since the total of 40 escudos per kilo remains unchanged. The surtax is equivalent to the special wolfram ore export tax of 36 escudos introduced last February but abolished in June, when export duties were increased to 40 escudos per kilo.

YUGOSLAVIA—The *Schweizerische Bank Verein* is reported to have offered the Yugoslavian government its financial assistance in modernizing the iron ore mining and the iron and steel industry in Bosnia and Serbia. A loan of 100,000,000 Swiss francs would be placed at the disposal of the government for the purchase of modern mining machinery. Repayment would be through the export of iron ore, iron and steel to Switzerland.

ITALY—Private Italian firms will be permitted to buy up to \$4,000,000 worth of blister copper to be used exclusively in the production of copper sulphate, while the ARAR—the *Italian Surplus Administration*—has been designated as the sole purchaser of \$1,000,000 of electrolytic copper from Japan, \$1,000,000 from Canada, as well as \$500,000 from the

United States. This is the decision of the *Ministry for Foreign Trade* regarding copper import procedures for the utilization of funds from the *European Recovery Program* authorized for this purpose. Italian private importers who have available sources of supply from these countries may carry out their imports through ARAR provided that they surrender to ARAR for redistribution 50 percent of the material imported by ARAR for their account.

HUNGARY—An electric steel furnace began operating at the *Diósgyőr* steel works during the second quarter of 1951, while a 40-ton open hearth furnace is in operation at the *Mátyás Rákosi Works*.

NORWAY—It is reported that the mining of uranium ore in the *Evje* mines will be suspended because of high operating costs. The mines have cost 1,000,000 kroner so far. The uranium needed for the atomic pile at Kjeller (north of Oslo) will have to be imported.

SPAIN—Lead production during the first three months of 1951 was 20,786 tons, against 16,831 tons during the same period of 1950. Besides the increased activity in the producing mines, various other mines are being reopened.

NORWAY—Shipments of iron ore from Narvik reached 860,000 tons in July, a new post-war high. For the first half of the year, 590 ore ships carried a total of 4,965,000 tons away from Narvik.

GERMANY—American interests are reported to be showing interest in a newly discovered uranium deposit near Wittichen in the Black Forest.

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PORTUGAL—First repayment of an ECA advance to develop ore deposits near Lisbon will soon be made when *Minas de Cerva* ships five tons of tungsten concentrates to the U.S. munitions stockpile. Last year, the *Economic Co-operation Administration* loaned the firm about \$52,000 to begin operations on mine sites formerly owned by the German company, *Empresa Mineira de Sabrosa, Ltd.*

GERMANY—In West Germany, officials of the former *Hermann Goering Works* are reported to have submitted a plan to Allied authorities for rebuilding the dismantled steel plant. The plant is currently producing pig iron at an annual rate of 200,000 tons. The rebuilding plan estimates a yearly production rate of 200,000 to 300,000 tons within two or three years, gradually reaching 800,000 tons. Under Allied regulations, West Germany cannot exceed a yearly limit of 11,100,000 tons unless the steel is to be used for Western defense. In East Germany, the Soviet Zone press reports plans to build a huge new steel plant on the West Germany zonal border, near Calbe. No capacity was given.

NORWAY—*Sulitjelma Mines*, which is producing copper, zinc, and pyrite concentrates, is considering shutting down its electrical furnace because of a lack of electrical power. The hydroelectrical power stations in the vicinity produce about 5,000 kilowatts, while the furnace needs about 2,000 kilowatts for economical working. The board of directors at *Sulitjelma* is planning to build a new hydroelectrical station with a production of 10,000 to 20,000 kilowatts.

NORWAY—Most of the machinery for the new 200-ton flotation plant planned by *Killingdal Mining Company* in Trondheim has been delivered by *Denver Equipment Company Ltd.* of London. The building of the plant was delayed but it is now expected to be in production by March 1952.



LATIN AMERICA

BOLIVIA—This country may soon become an important producer of zinc, judging by a statement reportedly made by the President of the *Military Junta* that special legislation encouraging zinc producers will soon be enacted. Presumably this legislation will be designed to permit large investment in the *Matilde* zinc property which is capable of producing 100,000 tons annually.

ARGENTINA—Recent reports indicate that there is a large tonnage of available gypsum reserves in Argentina which deserves further exploration. The main gypsum producing areas now are *Tapias* and *Vipos* (province of Tucumán), *Cañada Verde* and *Villa La Punta* (province of Santiago del Estero), *Tacopampa* to *Albigasta* on the pro oriental slope of *Ancastera* range (province of Catamarca), *Gobernador Gordillo* (province of La Rioja), *Los Cerrillos* and *El Luchito* (province of San Luis), *Hernandarias*, *Brugo* and *La Paz* (province of Entre Rios), *Fuerte Gral Roca*, *Allen* and *Cinco Saltos* (Territory of Rio Negro).

BRAZIL—A government decree has limited the export of beryllium ore during the second half of 1951 to 1,500 metric tons. Minimum price has been fixed at about \$35.33 per metric ton unit.

MEXICO—*Compania Minera Santa Maria del Oro, S.A.* at Durango milled approximately 67,528 dry metric tons of ore during the first half of 1951. Net profit was \$32,690.40. The company is a subsidiary of *International Mining Corporation*.

MEXICO—Claims to what he describes as an unusually rich vermiculite deposit, a vein about five-feet wide, have been filed with the *Ministry of National Economy* by A. Harry Siegfried, mining engineer. The deposit is near Chilpancingo, Guerrero, close to a highway to Acapulco, Guerrero's principal seaport. Mr. Siegfried is President of *Siegfried y Cia., S.A.*, Insugentes, Mexico D.F., manufacturers of mining power machinery.

SURINAM—During the first six months of this year, 1,007,036 tons of bauxite were shipped from Surinam.

BOLIVIA—The *Banco Minero* is reported to be considering an arrangement with the German firm, *Ferrostaal A.G.*, for the barter of between \$5,000,000 and \$10,000,000 worth of minerals, especially tin, against German capital goods. In return, Germany would furnish equipment for a proposed *Banco Minero* dynamite factory, rails, and tank cars. Presumably, only low-grade tin concentrates would be involved, not normally purchased by the *United States Reconstruction Finance Corporation*. Small producers are said to favor this arrangement because it would allow the fixing of a nominal price above that now being offered by the RFC.

MEXICO—Iron and steel production is receiving increasing attention in Mexico. *Altos Hornos de Mexico, S.A.* Monclova Coahuila, administered by the *Nacional Financiera, S.A.*, the Mexican government's fiscal agency, will start at double its capacity next August, because of installations it is making which are backed by the *Eximbank's* \$5,000,000 loan. The

announcement came from Lic. Eduardo I. Aguilar, president of the *Iron and Steel Industry Chamber*. The Oaxaca government plans an iron and steel works in the *Thaxiaco* district where Bank of Mexico investigators reported a coal deposit they estimate at 50,000 tons. The works would be serviced by the important iron deposit at *Zainza*, near *Pochutla*, a distribution center. The board of *Cia. Fundidora de Fierro y Acero de Monterrey, S.A.*, Monterrey, Nuevo Leon, Mexico's largest iron and steel works, voted to increase the company's capital to 50,000,000 pesos (\$5,780,000) in order to expand the company's operations. Money for the higher capitalization will be obtained from the sale of excess lands and by subscriptions by stockholders. An iron deposit has been discovered in *Vera Cruz*, a tract at *Arroyo, Agrio*. Ore samples, reported to assay at as high as 55 percent iron, are being checked by the *National Institute for the Investigation of Mineral Resources*. Road building in *Vera Cruz* by the state and federal governments is seen by the Institute as a stimulus to mining, particularly that of iron, in that state.

ARGENTINA—A geological survey of the lead and zinc deposits in the *Santa Rita* mine (Sierra del Toro), 31 miles from *Jague* in the province of *La Rioja*, has been made. Argentina's *Bureau of Mines* recently completed the first part of a survey of gold deposits found in the *Agua Tapada* district in the province of *Catamarca*. Results have been sufficiently encouraging to support prevailing optimism that a promising mining operation is likely to be established in that area. A survey party reportedly has returned from the high range of *Mendoza* (*Cordon del Portillo*) where a program of geological and mineral-resource study was conducted, sponsored by the national government. As a result of this investigation, indications of molybdenum, wolframite, and lead minerals have been reported.

BRAZIL—*Harbison-Walker Refractories Company* has organized a wholly owned subsidiary in Brazil which has acquired



GOLD PLACERING IN ARGENTINA

The illustration shows several men placering along the *Aluminé* River in Argentina. Such work is on a small scale but is the principal way of making a living in the area. Gold placers are scattered widely over Argentina. The average grade of this alluvial region is two grains of gold per cubic meter; the richer channel averages about three meters wide; and the fineness of the gold averages from 800 to 900. Black sand (magnetite) is the principal gangue.

INTERNATIONAL

exclusive mining rights to large deposits of pure magnesite. The company has had these deposits under consideration for some time and has based its decision to acquire them upon the results of geological studies and exploratory work.

MEXICO—Two Chihuahua mining companies, *Potosi Mining* and *El Potosi*, have complained to the Ministry of Na-

tional Economy that faulty electricity service is so hampering their operations that they are obliged to make short suspensions. The ministry, blaming the condition on drought that has reduced water for the *Boquilla* generating plant, assured the companies that all is being done to normalize the power service.

MEXICO—Export to Western Germany of two consignments of silver in coin and in bullion totaling 6,650,000 ounces, worth \$5,400,000, was announced by the Bank of Mexico. On a third contract for 6,000,000 ounces of silver in these forms, 1,500,000 ounces has been delivered, while an on-account shipment of 3,000,000 ounces of coin and bullion silver has been made on a contract that is being negotiated with the Bonn government. The Mexican Mint has produced 50,000,000 silver coins, worth \$15,000,000 for Saudi Arabia, the Bank announced. Circulation has begun, at the rate of 100,000 daily, of 5,000,000, new-type, five-peso silver pieces, each with a net content of 20 grams pure silver. The coins were produced by the Mint and distribution was made by the Bank. A contract is soon to be signed for the sale of 10,000,000 ounces of silver to Pakistan. It has not been specified whether this will be a minting or bullion arrangement.

minion Steel & Coal Corporation Ltd. hopes to raise annual production at its mines from 1,600,000 gross tons to 2,500,000 by 1952. Huge orders are responsible for the boom: Germany ordered 560,000 tons a year for five years, the steel mills at Sidney, Nova Scotia called for 590,000 tons, and the United Kingdom ordered 1,120,000 tons for delivery over a five-year period.

CALIFORNIA—The world's largest deposit of 14 rare earth minerals is said to have been uncovered in the California desert. The *Molybdenum Corporation* has acquired the property and is making geological surveys, diamond drilling, and carrying on underground development work.

QUEBEC—A drilling program is being conducted by *Ascot Metals Corporation* on the *Sterret* chrome-asbestos property known as the *St. Cyr* mine. Drilling has indicated asbestos for a length of 1,000 feet across a width of 450 feet. Holes have proven the body to a depth of 400 feet. A surface outcrop for another 1,000 feet also shows asbestos fiber. The *Quebec Department of Mines* is said to be testing one of the drill cores.

NORTHWEST TERRITORIES—Acting upon recommendations from its consulting engineer, *Indigo Consolidated Gold Mines* is said to be embarking upon an extensive development program during this next year at its *Indin Lake* property. Plans call for the installation of a 100-ton-daily-capacity mill and a mining plant. The shaft would then be dewatered and deepened to 1,000 feet, with levels established at 325-foot, 650-foot, 825-foot, and 1,000-foot depths. Indicated shoots on the third level, 475 feet, would be prepared for stoping, and the No. 3 showing (indicated by diamond drilling about 1,500 feet south of the shaft) would be drilled to a deeper horizon and opened underground from the third level.

ONTARIO—A drive on the 5,500-foot level of *Coniaurim Mines* is now reported to be within 150 feet of the boundary of *Central Porcupine Mines*. A winze will be sunk shortly to provide for deep development of the area.

MONTANA—Manganese-buying depots are to be established at Butte and at Philipsburg by the *General Services Administration* to purchase an estimated 600,000,000 pounds of the strategic metal.

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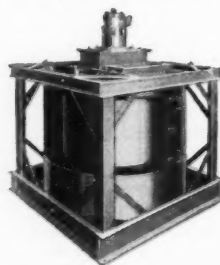


NORTH AMERICA

ALASKA—Tungsten deposits in the *Gilmore Dome*, *Steele Creek*—*First Chance Creek*, and *Pedro Dome* areas, 10 to 20 miles northeast of Fairbanks, have been reported on and mapped by F. M. Byers, Jr., a geologist with the *United States Geological Survey*. This area, principally important because of its gold-bearing quartz lodes, has produced tungsten at intervals since 1916. The report has been released by the *United States Department of the Interior*, and a limited number of mimeographed copies are available free on application to the Director, Geological Survey, Washington 25, D.C.

NEWFOUNDLAND—A mechanization and modernization program is under way at Bell Island, Newfoundland, to increase production of iron ore. *Dominion Wabana Ore Ltd.* (a subsidiary of Do-

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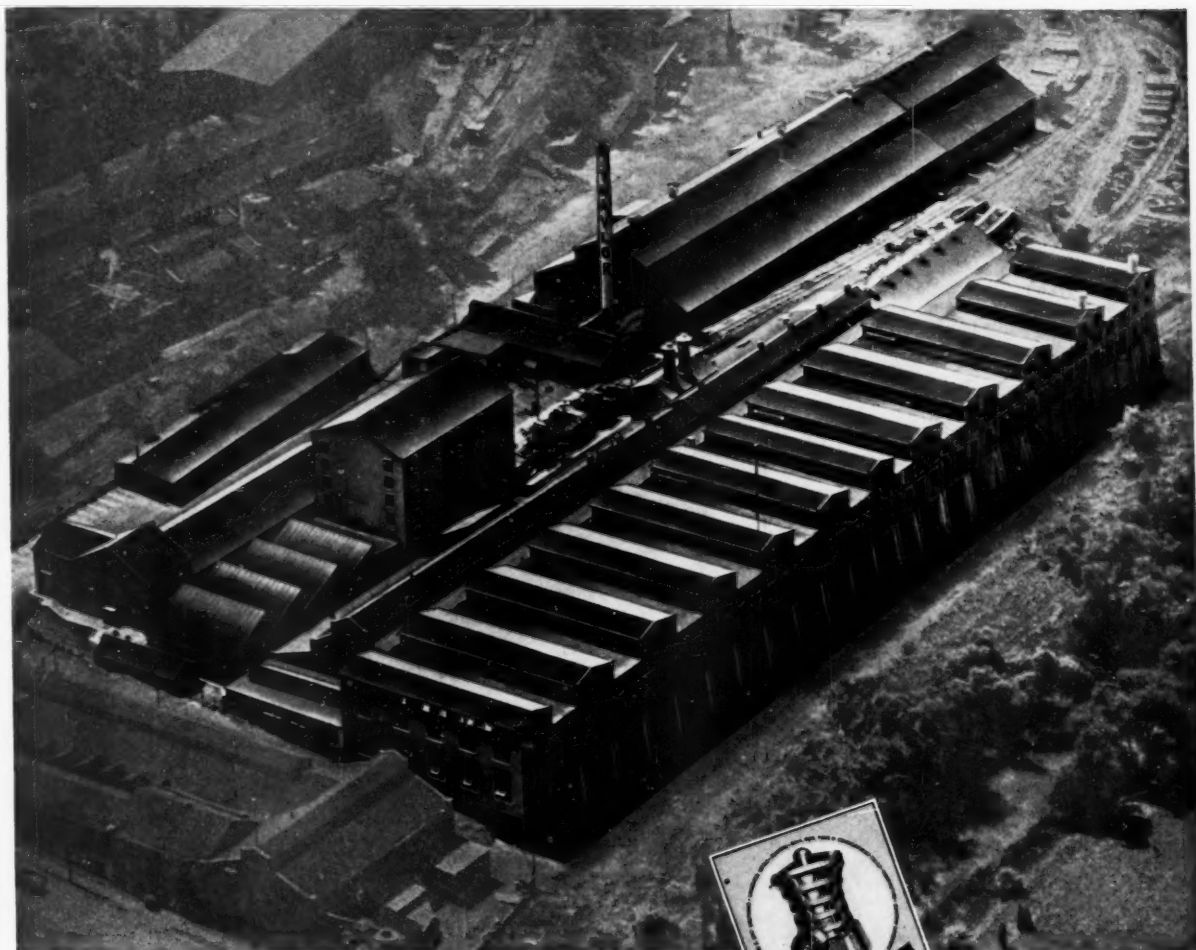
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BRITISH COLUMBIA—Expansion of the *Bosun* mine by *New Santiago Mines* is progressing. The *Bosun* has been developed by six adits, and two lower levels No. 7 and 8, reached by winze from No. 6 level. Planned expansion calls for drifting on the three lowest levels, extending the present faces east on No. 6 and 7, and sinking the winze another level to No. 9. A contract has been let for an adit to be driven from the No. 6 level some 200 feet south to an indicated zone cut by old diamond-drill hole No. 1. The hole picked up silver, lead, and zinc mineralization about 190 feet south of the level in what is believed to be a parallel formation. It was drilled horizontally from the No. 6. The compressor room is being enlarged to accommodate an additional compressor which will provide extra power for proposed deeper development from the No. 8 level. A 75-to-100-ton-daily mill is nearing completion. It has also been reported that *New Santiago* has found an extension of the *Bosun* vein at its *Slocum* area, a considerable distance southeast of the main vein.

ALASKA—About 40 new Alaskan topographical maps have been published this past summer by the U. S. *Geological Survey*. Among the areas covered are *Candle*, *Cordova*, *Healy*, *Kotzebue*, *McCarthy*, *Ruby*, *Solomon*, *Wainwright*, and *Bristol Bay*. Copies may be obtained from the Chief of Distribution, Geological Survey, Washington 25, D.C., at 25 cents each, and a free index map showing the areas in Alaska covered by Survey mapping is also available.

ONTARIO—Exploratory drilling is under way at the 200-acre property of *Renprior Zinc Mines* near *Renfrew*. Newly incorporated in August of this year, the company obtained a lease on the property from *Renprior Mines*, and purchased a 50-ton-daily mill. The previous operators had been mining by open-pit methods and it is expected that this can continue for about 60 feet. Present drilling is aimed at outlining the extent of the surface occurrences. M. H. Sullivan is president, while mining operations are under the direction of C. A. Campbell, consulting engineer, and H. J. Logan, resident mine manager.

BRITISH COLUMBIA—Ore has been opened on the No. 5 level of the *Silver-smith* mine at *Sandon*, B.C., by *Carnegie Mines* which has an option on the property. If the ore warrants it, mill capacity

will be stepped up from 125 tons daily to 200 tons.

NORTHWEST TERRITORIES—Initial mill operations of 30 to 50 tons daily have started at the *Outpost Islands* development of *Tungsten Corporation of Canada, Ltd.* Production of tungsten and copper-gold concentrates will be increased to 50 to 75 tons when the mill goes into regular operation after this test schedule.

QUEBEC—Diamond drilling is to be resumed on the property of the *Lavalie Mines*, west of *Golden Manitou Mines* in *Bourlamaque* township. Present plans call for a cross-cutting hole to be put down first to locate the continuation of the main shear. Deep drilling will then be undertaken, with depth of the first hole aimed at about 2,000 feet.

ONTARIO—The *Matachewan Consolidated Gold Mine* will be closed soon after the first of next year, and its mill will be converted to the treatment of lead-zinc ore from the *Matarow Lead Mines*. The *Matarow* shaft has been sunk to provide a second level of 300 feet and crosscutting at this level has started. Drifting is being carried on at the 150-foot level. The *Matachewan* mill had been treating 750 tons of ore a day, concentrating gold-bearing sulphides by flotation, and cyaniding the concentrates. Only the flotation plant will be used on the lead-zinc ore, and about 200 tons is scheduled to be handled each day. *Matachewan* is providing funds to help in the development of the *Matarow*, with profits to be split equally after repayment of capital outlays.

ARIZONA—Uranium ore is being mined by two companies in the *Lukachukai* Mountain in northeastern Arizona. Largest producer is *Navajo Uranium Company*, and the other is the *Climax Uranium Company*. The U. S. *Atomic Energy Commission* is diamond drilling the area for other deposits.

BRITISH COLUMBIA—The *Dorreen Mines* mill near *Hazelton*, is increasing the amount of ore treated until it reaches full capacity of 90 to 100 tons daily. In the mine, a raise is being driven from the main haulage level to speed up the opening of other ore horizons. Surface work has exposed a lead-silver-zinc vein which will be explored further.

QUEBEC—Dewatering has been completed on 14 levels of the *Weedon* mine operated by *Weedon Pyrite & Copper Corporation*, near *Sherbrooke*. Only a

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few small winzes remain unwatered. Drifting has started on the 10th level, southwest in the main ore structure. Drifting on the 12th level will start later. "Northern Miner" reports that good copper values have been exposed across a narrow width in the face of the southwest drift, and driving from this point will be undertaken in search of new ore. It is planned to drift 400 or 500 feet and do some flat drifting.

ONTARIO—*Discovery Yellowknife Mines*' new hoist has been used to deepen the shaft to 950 feet. Lateral developments on the new 650- and 800-foot levels have started, but the 950-foot level will not be opened for a while.

BRITISH COLUMBIA—Diamond drilling has been started by *Nubar*

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Mines Ltd., on the newly acquired claims adjoining **Ainsmore Consolidated** at Ainsworth. **Hercules, Sullivan,** and **Noranda** are the principal claims.

QUEBEC—Recent work on the east orebody of the **Golden Manitou Mines** includes drifting on the 960-foot level which has been opened to a length of 185 feet. Full width has not yet been estimated, while drilling indicates that the length may extend 500 feet. Drifting is also under way on the 810-foot level, and an ore has been found on the 1,570-foot level. Further drifting and drilling is also going on at the 1,720-foot level and at the 1,410-foot level. This is only a part of the activity being carried on which has led President H. W. Knight to describe it as one of the best zinc orebodies in Northwestern Quebec.

BRITISH COLUMBIA—Preparations are being made to sink and develop new levels on the No. 27 vein of **Pioneer Gold Mines** in the **Bridge River** district. Actual sinking operations should be well under way by next winter.

ALASKA—**United States Smelting, Refining & Mining Company** is reported continuing operation of its five gold dredges at Fairbanks, and three dredges at Nome, despite serious labor shortages.

QUEBEC—**Quebec Iron & Titanium Corporation**, a subsidiary of **Kennecott Copper Corporation** and **New Jersey Zinc Company**, is said to have shipped 3,000 tons of titanium-bearing slag from the operations of its first furnace. Another furnace is ready to start and a third should be in operation by next year. Eventually, five furnaces will be in operation.

BRITISH COLUMBIA—An operating profit of \$51,274.90 was realized by **Violamac Mines Limited** for July and August. During that period, 554 tons of silver-lead-zinc ore was produced by the **Victor** mine near Sandon, B.C., and was valued at \$95,925.25. This ore came mainly from 5-level winze and from 7-level drift. Ore has now been opened in 7-level drift for 170 feet, with an average thickness of 3.5 feet. When a connection has been made between 5 and 7 levels, ore will then be mined from both these levels to continue shipments of high grade to the smelter and lower grade to the mill.

ONTARIO—**Bethlehem Steel Company** has formed the **Marmoraton Mining Company, Ltd.** to mine the iron ore deposit at Marmora, 30 miles north of Trenton, Ontario, where surveying and diamond drilling have been in progress since 1949. About 225 men will be employed and nearly 150 feet of limestone capping will be stripped from the orebody before mining is scheduled, in 1953.

WASHINGTON—**American Smelting and Refining Company** plans to mine its new **Van Stone** zinc-lead deposit in northern Stevens County by openpit methods. The company has selected its pit site about 1,500 feet from the pit site, and a new four-mile road is being built to the former. Construction of the 1,000-ton mill is scheduled to start as soon as materials are obtained. Meantime, extensive diamond drilling operations are continuing with reportedly good results.

BRITISH COLUMBIA—To make the **Emerald tungsten** mine near Salmo, southeastern B.C., one of the continent's biggest

producers is the aim of the **Caadian Exploration Ltd.**, which runs the mine for the government. The capacity of the 250-ton mill, now being completed, will be more than doubled. Encouraging results of diamond drilling in the company's ground adjacent to the mine proper have been reported.

ALASKA—The U. S. Geological Survey has released a report and map by Richard G. Ray, geologist, on the Geology and Ore Deposits of the Willow Creek Mining District, a small but important lode-gold mining region in the Talkeetna Mountains of southern Alaska. The report is on file at several cities including Anchorage, Juneau, Fairbanks, and Washington, D. C.

BRITISH COLUMBIA—**Privateer Mine Ltd.**, formerly a gold producer exclusively at its property in the Zeballos district, west coast of Vancouver Island, is now in the base metals business. President A. H. Davis reports that the company has taken an option on the **Star** mine near Ainsworth, a lead-silver-zinc property.

MINNESOTA—The **Inter-State Iron Company** of Virginia will re-open the **Greenway** mine and begin development of its **Lind** mine this fall or winter. The properties are about five miles west of Grand Rapids and contain an estimated combined tonnage of 5,384,964 tons. A concentration plant will be built on the Greenway side of the Prairie River which will be bridged to permit hauling the **Lind** ore to the plant, the **Lind** being on the east side of the river. Shipments are scheduled to begin in 1953. The **Greenway** was operated by the **Evergreen Mining Company** from 1940 to 1944.

BRITISH COLUMBIA—Planning for year-round operation of the **Whitewater**

mill at **Retallack, Kootenay Belle Gold Mines** has begun an intensified underground program at the nearby **Altoona, Monitor** and **Whitewater** mines, three of seven mines recently acquired by the company. Near Sandon the second plant erected on the **Richmond-Eureka** property has begun operating; its capacity is between 600 and 800 tons daily.

NORTHWEST TERRITORIES—The **Radiore Uranium Mines Ltd.** has been formed to consolidate the **Con** and **Ace** groups, the **Con** consisting of 1,250 acres on the south shore of **Beaverlodge Lake** and on the west shore of **Lodge Bay** of **Lake Athabaska**, and the **Ace** consisting of 1,200 acres on the north shore of **Beaverlodge Lake** next to **Eldorado Mining's Ace** mine. The ground had been held by **Athona Mines** (1937) **Ltd.**, **Greenlee Mines Ltd.**, **Goldcrest Mines Ltd.**, and **American Yellowknife Gold Mines Ltd.**, which companies own all the vendors stock in the new company. Diamond drilling has already begun on the **Ace** group, and a second machine is being placed on the **Con** group. This will be followed by underground development on both groups. Both properties show commercial bodies of uranium ore. J. J. Byrne is president.

ONTARIO—As a result of successful preliminary tests, **MacLeod Cockshutt Gold Mines, Ltd.** is converting its mill from the roasting method to straight cyanidation of flotation concentrates in order to achieve better recovery from its arsenical ores and to reduce costs. Eventually, elimination of flotation also may be done. Additional mill equipment would then be necessary but would allow an increase in milling rate from the present 1,000 to 1,400/1,500 tons daily. Ore comes from the big "F" orebody.



ALCAN'S HUGE ALUMINUM CENTER

An aerial view of the largest aluminum production center in the world—**Aluminum Company of Canada, Ltd.**, at **Arvida, Quebec**. The plant can produce 2,000,000 pounds of aluminum per day. During World War II, it supplied the United States with 1,364,000,000 pounds. The site was selected in the mid-1920's because of the **Saguenay River** which could provide a tremendous hydroelectric potential and easy transportation by means of deep-sea freighter. In the lower right-hand corner, the new \$1,000,000 research laboratory can be seen.

PRODUCTION EQUIPMENT PREVIEW

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To get any item of free literature illustrated or described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP coupon, and mail it to Mining World, 121 Second St., San Francisco 5, Calif.

LONGER LIFE FOR TRACK ROLLERS: A revolutionary new track roller for track laying tractors uses dirt-exclusion, "Flow-Away" grease seals. The shaft and dirt exclusion seals are interchangeable for use in "Caterpillar" rollers. Circle PEP No. 1 for complete data.

BALL & ROD MILLS: For information concerning the Marcy line of open-end ball and rod mills manufactured by Mine & Smelter Supply Co. (MASSCO), circle 2.

NEW INSTRUMENT SOUNDS BOREHOLES FOR URANIUM: The development of a compact precision instrument which can "sound" boreholes for uranium to a depth of 10,000 feet and withstand water pressures of 5,000 psi has been announced by electronic experts in Pretoria, Union of South Africa. The instrument is so designed that, as it is lowered on thin wire into the borehole, it sends back to the surface "clicks" over a loudspeaker. A permanent record of these "clicks" are made on a strip of paper. The instrument, specifically designed to be used in holes an inch and a half in diameter, costs less than a dollar a day to operate. Present American methods, requiring much larger holes, cost nearly \$1,000 for a like amount of surveyed hole. Further information will be furnished if No. 7 is circled on the PEP card.

LOADERS: For full information on how the new developments in rocker shovels can save you money in loading and materials handling, write Eimco Corporation, 634 So. 4th West, Box 300, Salt Lake City, 10, Utah, or circle PEP No. 8.

SLUSHING PRODUCTS, BIT KNOCKER: A new 12-page bulletin describes Alloy Steel & Metals Co.'s complete line of Pacific products for scraper mining: the new Slushmaster scraper available in sizes from 26 to 60 inches, the Round-the-Corner sheave block, a variety of sheave blocks and anchors, and also the Bit Knocker for removal of single-use bits. Circle 13.

DIESEL TRACTOR: An interesting pamphlet on the DW20, Caterpillar's new high speed diesel tractor for lower cost earthmoving, is available. It contains a 33"x21" four-color cutaway view of the DW2, keyed to features of the machine, along with information on the No. 20 Scraper, W20 Wagon and No. 20S Bulldozer, all designed and built for the DW2-Tractor. Circle No. 14.

PUMPING UNITS: Economical pumping units for every industry are cataloged in a new "Handy Guide to Selection of Centrifugal Pumps" released by Allis-Chalmers. For Bulletin 52B6059G, circle No. 17.

AUTOMATIC COUPLERS: Circulars No. 1746 and No. 5240 contain details on application of Willison automatic couplers to your cars and your jobs to enable you to handle more tonnage per day with maximum safety. Circle PEP No. 20.

MINE HOISTS: Nordberg has published a new 24-page bulletin illustrating their complete line of mine hoists and describing, with pertinent engineering data, the installation of these units. Circle No. 22.

BITS: How to successfully recondition tungsten-carbide bits is shown in a 20-page book released by Rock Bit Sales & Service Company. Many helpful operating suggestions are given for obtaining the maximum speed and footage out of carbide bits. This information is yours if you circle 23.

MINERAL TESTING LABORATORY: The Western Machinery Company announces the opening of a Mineral Testing Laboratory to provide a world-wide mineral testing service on a cost basis. Additional information on the new laboratory will be sent to you; circle No. 24.

REAGENTS: An eight-page bulletin containing interesting resumes of the application of American Cyanamid reagents to a variety of copper ores in Canada, Mexico, South America, Africa, Australia and the United States has been issued by American Cyanamid Company. For copies of "Current Reagent Practice on Copper Ores," circle No. 25.

VALVE SEAL: The Rodic Chemical and Rubber Corporation has announced a revolutionary innovation in the field of valve design. Samples and complete information on the new Rand seal may be obtained by circling No. 28.

LOW COST MATERIALS HANDLING: Pioneer Continuo equipment is successfully extending the lives of many old mines on both the Mesabi and Cuyuna ranges in Minnesota by profitably handling low grade ores. For further information on the line of feeders, screens, crushers, and conveyors produced by the Pioneer Engineering Works, circle number 30 on the PEP card.

DUST COLLECTION SYSTEMS: Complete literature from Northern Blower Co., Cleveland, Ohio, on methods of dust collection and cooling is yours by circling No. 31.

DUTCH STATE MINES CYCLONE: Fines separation from 20 micron to 100-mesh sizes by new DorrClone. Further information available from MINING WORLD or by writing to Dorr Co., Stamford, Conn. Circle No. 32.

RECTIFIER: The Westinghouse Ignitron rectifier is a mercury-arc unit with high efficiency in the low-voltage range; available in a wide range of outputs and sizes, it is non-rotating, brushless, simple to install, and provides positive control of output voltage. Circle 34.

RESEARCH FOR THE MINERAL INDUSTRY: A 28 page, profusely illustrated report on the activities and facilities of the Colorado School of Mines Research Foundation for projects covering the fields of geology, geophysics, metallurgy, and mining. For a report on this outstanding organization circle No. 35.

PEP Editor

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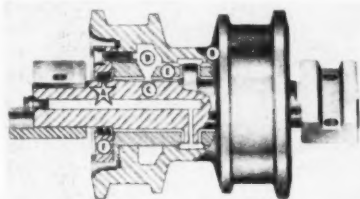
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Dirt-Exclusion Rollers Assure Longer Life

A new series of tractor track rollers with dirt-exclusion seals is proving successful in preventing costly roller replacements on track laying tractors. The new rollers use "Flow-Away" sealing which permits a small amount of grease to pass outward through the seals, and at the same time excludes all dirt, grit or abrasive matter from the roller.

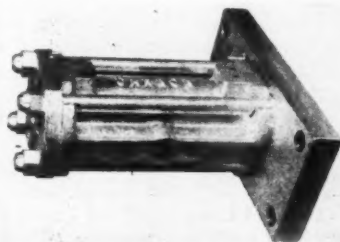
Outstanding features of the tract rollers are shown in this cut-away view:



(A) "Dirt-Exclusion" seal; (B) one-piece shell; (C) center thrust type shaft; (D) grease reservoirs (five times capacity of conventional rollers); (E) bronze bushing; and (F) seal housing. The one-piece roller shell is made in a uniform-section manganese alloy steel casting, heat-treated to insure the right degree of hardness for long performance-life. Extra grease capacity is built into the shell. Roller shell, shaft and bearings are exactly the same dimensions as "Caterpillar" rollers. The shaft and "dirt-exclusion" seals are interchangeable for use in "Caterpillar" rollers. Circle PEP no. 73 for additional data about these longer wearing rollers.

Chute Maintenance Reduce By Air-Cushion Vibrator

A new principle of operation has been incorporated in a recently designed vibrator for chutes, bins and hoppers.



Metal-to-metal pounding has been eliminated by air-cushioned impact, resulting in quieter operation, less general maintenance, and longer vibrator life. Since heavier pistons with longer strokes are used, more effective pulsating action is created. Circle no. 70.

New A-C Bulletin On Induction Motors

Construction features of Allis-Chalmers large end-shield bearing, squirrel-cage induction motors are described in a new bulletin released by the company. Built for a wide range of applications from central station auxiliary to general industrial drives, these motors are available in ratings and speeds up to 1750 hp at 1800 rpm.

Construction features of the motors include welded stator yoke, long-life sta-

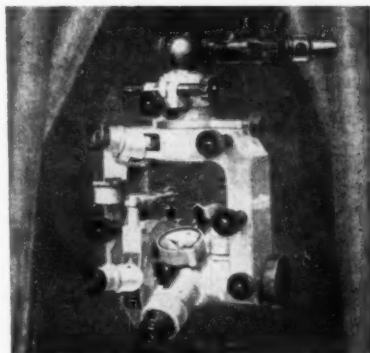
tor winding, capsule housings, split-sleeve bearings, air-gap access holes, silver-grazed cage, protecting end shields, large discharge openings, and inherently drip-proof design.

The bulletin points out that the motors can be had with special electrical modifications to suit application requirements. Although sleeve bearings are standard, motors may be obtained with capsule, anti-friction bearings whenever the speed and application are suitable. Numerous other mechanical modifications, such as double-shaft extension or three-bearing construction, are also available. Terminal boxes for all leads are standard for many ratings and can be added for all ratings.

Copies of "Allis-Chalmers Large Squirrel-Cage Induction Motors," (Bulletin 05B7542A, are available upon request. Circle 99.

Revolutionary New Mining Transit Now Available

Inventors of the original mining transit, the Breithaupt Company of Kassel in West Germany, has developed a new



transit designed specifically for mine surveying where tripods are often difficult or impossible to use. The instrument, as well as backsight and foresight signals, are suspended from steel pegs driven into drift or stope timbers. Standard tripod fittings are also furnished to be used where space is no problem. The 2½-inch horizontal plate is graduated to one minute; the 25-power telescope has a 30 millimeter aperture; and the entire transit is fully enclosed and dustproof. For further information on this new mine transit circle PEP no. 75.

Booklet Will Be Given With New MSA Skullgard

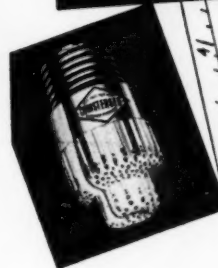
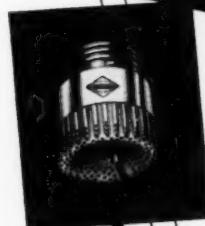
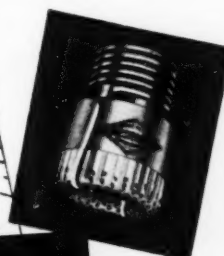
To stimulate wearing of protective hats, Mine Safety Appliances Company of Pittsburgh, Pa. has published an illustrated booklet which will be given with every new MSA Skullgard. The booklet points out the vital importance of adequate head protection by listing eight representative examples from the many in MSA files where workers have escaped serious injury and even death when struck by falling objects while wearing Skullgards.

A section of the booklet is devoted to the care of the MSA Skullgard. Proper precautions which prolong the life of the protective hat are shown.

Important design features of a protective hat are also discussed. Copies of the booklet may be obtained by circling 93.

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THE COMMUNIST LINE

The convention of the independent Mine, Mill and Smelter-Workers Union was held this year in Nogales, Arizona. This Union was expelled from the C. I. O. because its leaders followed the Communist line. The list of speakers at the convention would indicate that the expulsion was justified and that the same influence is still in control.

One would be justified in wondering why this convention was brought right down to the southern limit of its jurisdiction. Was it from consultation with the leaders of the Mexican unions who also follow the Communist line, or was it to bolster the morale of the mine workers?

The chief speaker of the convention was Harry Bridges, who is still fighting against deportation. That he should fight is not strange because the "pickings" in the United States are much better than they would be in Australia. Then, too, Harry is not sure of his welcome "down under." They do not want a return of his disruptive tactics. Also, the practical application and operation of his economic theories have proven that they were disastrous failures with deficits totalling hundreds of millions of dollars. The dozens of governmental socialistic operations were all total failures with only single exception. That was a resort hotel whose success was due, not so much to the management, as to the Heaven-sent climate, a refuge from the rigors of less-favored localities.

Why any American, be he farmer, worker or businessman, should follow the Communist line is a constant source of wonder. The Communist creed is published for all to read in their Bible, the *Manifesto*. They throw into the discard everything that we hold dear. Here are a few samples: - "We do not believe in God" . . . "We repudiate all morality that is taken outside human, class concepts." . . . "There are besides eternal truths, such as freedom, justice, etc. that are common to all states of society. But Communism abolishes eternal truth, it abolishes all religion, and all morality, instead of constituting them on a new basis" . . . "In this sense, the theory of the Communists may be summed up in the single sentence: Abolition of private property." . . . Abolition of the family." From whence then can come honor and honesty? From nowhere! The answer lies in the debris of 30 of their treaties.

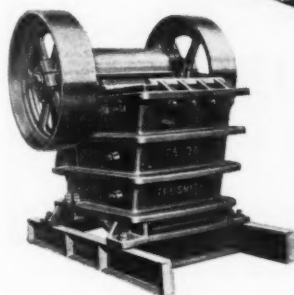
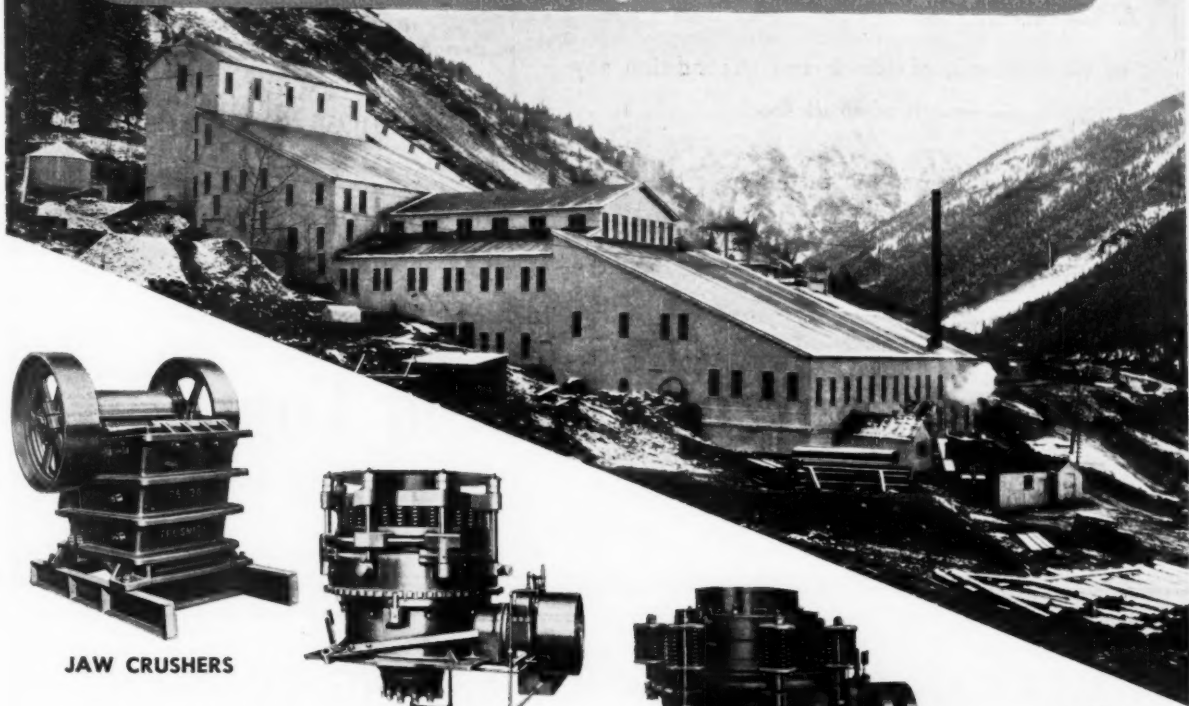
After visiting Russia some years ago, an idealistic American Socialist closed the report with the sentence: "I wonder what will become of the soul of the Russian people?" That writer need not have wondered for under Stalinism they have no souls, but all are reduced to the status of man-animals. Horses, cattle, pigs, and man-animals are to be judged by a single standard: "What is its value to the State." From this we can begin to understand, but not condone, the purge and the slave labor camp.

A number of years ago there were 10 men in the inner circle of the Kremlin. Due to purges and induced "heart failure," they fell away one by one till only five were left. Still further names dropped from public notice till only one of that circle was left. Any economic or political system under which a man can rise to pre-eminence upon a pyramid of coffins does not have any of the elements of a democracy.

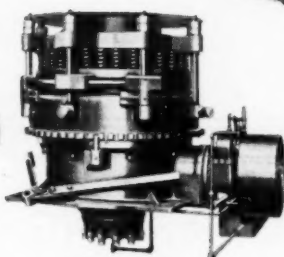
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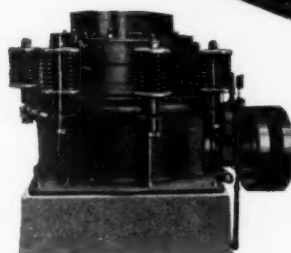
Mining Equipment



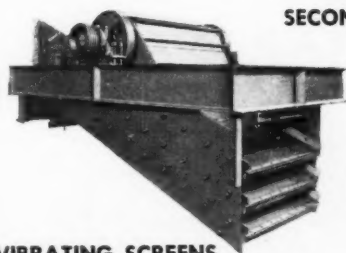
JAW CRUSHERS



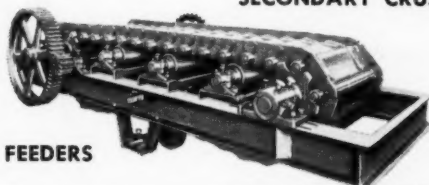
GYRASPHERE
SECONDARY CRUSHERS



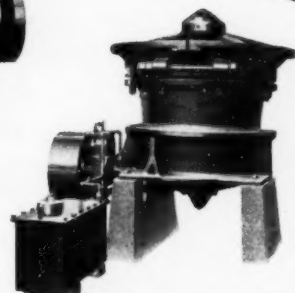
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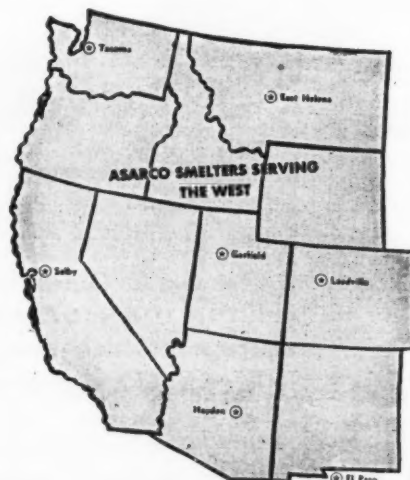
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DMPA Sets Copper Price For Bisbee East Orebody

The Defense Materials Procurement Agency has in effect established a floor under the price of copper to be mined by Phelps-Dodge Corporation at its Bisbee East orebody in Arizona.

The government has agreed to buy, at the rate of 22 cents per pound, up to 112,500 tons of the first 150,000 tons produced, provided the company cannot sell it to other purchasers in the U.S. at a higher price. A new concentrating and leaching plant will be built there, which should boost copper production 38,000 tons a year beginning in late 1954 or early 1955.

Molybdenum Corp. Buys Rare Earth Deposit

A California tract of land said to contain the world's largest deposit of 14 rare earth minerals has been acquired by the Molybdenum Corporation of America. The property, measuring roughly 3 miles by 1½ miles, is located in eastern California near the Nevada border.

The company has had an option on this property since the middle of last year and has been busy making geological surveys, diamond drilling, and carrying on underground development work. According to a company spokesman, this activity has indicated that "rare earth minerals will no longer be rare."

Cerium, lanthanum, ittrium, gadolinium, samarium, and neodymium are among the most important found on the property. They are used as deoxidizing agents in the production of stainless steel and produce denser steels. The rare earths are also used for a variety of purposes such as anti-sickness remedies, lighter flints, carbon arc lamps, ceramics, and polishing materials.

A large orebody has been opened up and open-pit mining is under way. A mill, located on the property, will be adapted to beneficiation of the ore.



The 50-ton table and flotation mill at the old *Monte Cristo* mine has been revamped by W. L. Nutter of Wickenburg, Arizona, to handle tungsten ores. He has made several small runs from tungsten ore produced from his own properties and plans to accept some custom ores if adapted to his mill set-up. He is employing three men in the work.

A 25-ton test shipment of uranium ore has been made from the old *Hillside* mine, in Yavapai County, Arizona, to Marysville, Utah, site of the government's purchase depot. The shipment was made by Charles H. Dunning, Phoenix, and

Fred Schemmer of Prescott, who hold a partnership lease on the *Hillside*. According to Dunning, the ore was mined from three locations in the mine and was carefully sorted so that it is of high grade.

About 40 tons of gold, silver, copper, lead ore are being mine per week at the *Cash* mine, 12 miles south of Prescott, Arizona. Present work, which employs a crew of six men, consists of drifting and stopping on the 600-foot level of the mine. The mine is operated by Orr and Dickie, Jack Orr, superintendent. They also hold a lease and option on the *Senator* mine and plan some exploration work on the Ten Spot vein of that property.

The *Mikas Mining Company* of which Tom Collas is mine superintendent. Oracle, Arizona, is mining about 15 tons daily of tungsten ore in the form of scheelite at the *Morningstar* mine. The property is located in the Old Hat Mining District, about seven miles south of Oracle, and is owned by Collas, John Paulos, and Nick Mikas. The ore is hauled to the Goldfield mill, near Apache Junction, for initial treatment, and the resulting product is sold to the U. S. *Vanadium Company* of Bishop, California. The ore is said to run from 1 to 1.5 percent tungsten trioxide, but, because of the lead carbonate content, recovery at the Goldfield mill is only about 70 percent. Three men are employed at the mine, working in tunnels and open cuts.

Setland McFarland and Sid Hullinger of Utah have announced the purchase of the *Boston Arizona* mine near Skull Val-



Pictures By Arizona News

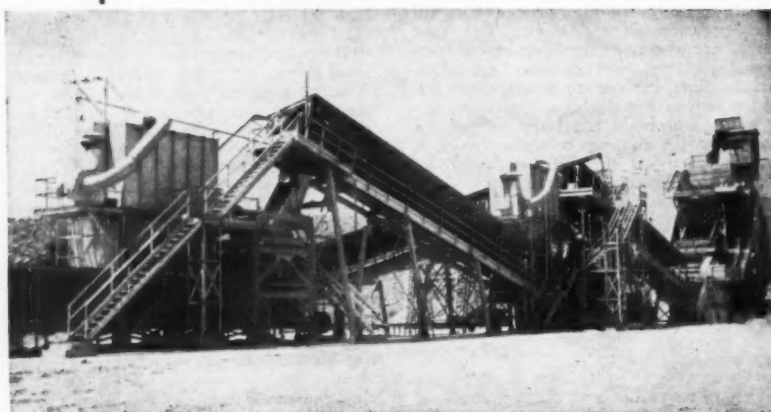
COPPER CITIES MINING COMPANY STRIPS FIRST OVER BURDEN

The Defense Minerals Procurement Agency has agreed to buy, at 23 cents per pound, up to 170,000,000 pounds of the first 192,000,000 pounds of copper to be produced by the Copper Cities Mining Company from its Copper Cities orebody north of Miami, Arizona. Stripping operations at the site of the future open pit are shown above. LEFT: The first million tons of overburden has been stripped from Sleeping Beauty Mountain, and RIGHT: Overburden is dumped into one of the canyons on the side of the mountain. A series of these dumps form the horizontal white line in the picture at left.

Copper Cities is a subsidiary of the Miami Copper Company. Equipment for the project has been transferred from Miami's Castle Dome open-pit mine. The 10,000-ton-per-day concentrator will also be moved when the Castle Dome orebody is depleted. First production from the Copper Cities is expected in October 1954 at an annual rate of 22,500 tons of copper.

R. W. Hughes is Miami general manager and J. C. Van De Water is mine superintendent of both Castle Dome and Copper Cities. A total of 102 men are stripping on a two-shift basis under their direction.

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ley, Arizona. The property consists of five claims in the Copper Basin district, carrying ore values in copper, lead and zinc. The Utah men propose to start work immediately.

Approximately 90 tons of copper-lead-zinc ore is being mined daily at the Antlers mine of the Yucca Mining and Milling Company, Inc., Yucca, Arizona. The ore is milled in the company's 135-ton-capacity concentration plant. Operations are under the direction of R. J. Dalton, president and manager, Box 67, Yucca. Twenty-five men are employed.

O.P.M. Dempsey of Klondyke, John Williamson of Globe, Herb Hatner of Klondyke, and associates have taken over under lease and option a group of 82 claims in the Aravaipa district of Arizona and have started active exploration work. Access roads have already been built and housing units are being erected. The new operators expect to employ a crew of from 10 to 15 men as soon as Williamson completes an asbestos contract north of Globe and can move his equipment to the lead-zinc claims and take direct charge of the work.



Central Eureka Gold Mines reported its largest gold strike in ten years in its mine at Sutter Creek, Amador county, California. The orebody was found on the mine's 3,800-foot level and apparently rakes at a high angle toward the old Eureka shaft. The orebody may have a strike length of 650 feet at the 4,150-foot level.

Philip Carey Company of Cincinnati is diamond drilling the Stark asbestos property near Nevada City, California. An extensive deposit reportedly has been indicated and large-scale operation is planned if diamond drilling confirms the results of the exploratory work.

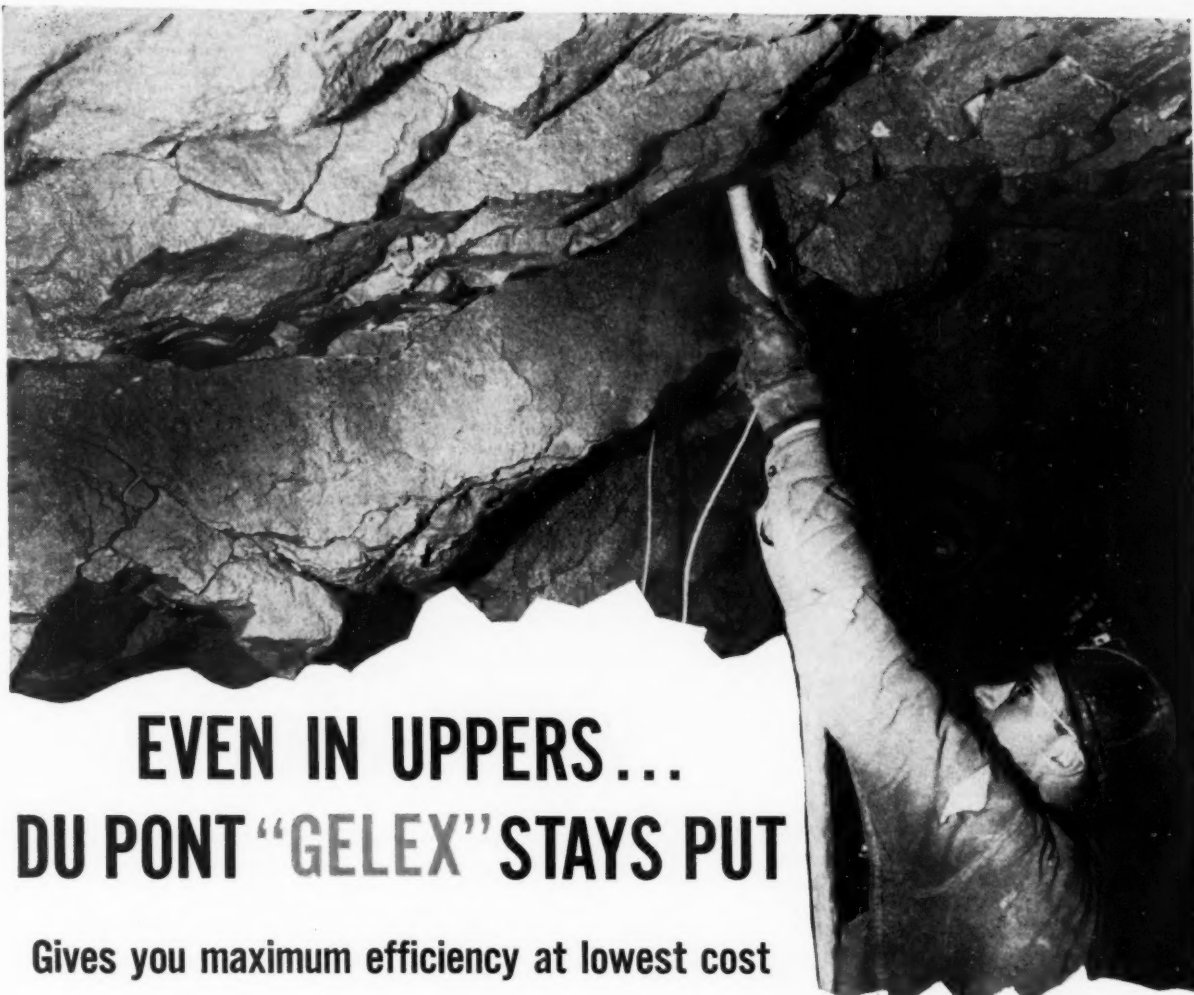
Mining at the Marble Springs gold mine near Coulterville, California, is progressing on the 400-foot level. Its new mill is being equipped with a primary jaw crusher, rod mill, jigs, and flotation cells.

The \$10,527 DMA loan granted to Petroleum Investment Trust Ltd. is being used to explore for tungsten on the old Baltic mine property in the Stringer district near Randsburg, California. Drill holes are being spaced from 50 to 100 feet apart over an area covered by four claims owned by Max Hess. Petroleum Investment is leasing the property, which has not been operated consistently for over thirty years.

The Indian Camp asbestos claim in the Gold Belt Spring area of Inyo county, California, has been purchased by F. duMontier. It is attracting attention as a possible commercial source of chrysotile asbestos.

To support the increased output of steel products, production at Kaiser Steel Corporation's Eagle Mountain mine in Riverside County, California has been stepped up. New equipment has been acquired, and improvements in employee housing facilities have been made to stabilize employment. Production during the past year totalled 1,094,990 net tons of iron ore averaging 53 percent iron. In a recent State Supreme Court verdict, the company's title to Eagle Mountain mine was cleared.

MINING WORLD



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BLASTING SUPPLIES AND ACCESSORIES



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Development work at the *Last Chance* gold mine north of Nevada City, California, is progressing from 150 to 600 feet below the old workings. Rehabilitated by the *Shamrock Mining Company* last year, a vein has been located by a 700-foot crosscut tunnel. It is said to vary in width from 30 inches to four feet.

The *Blackstone* gold mine near San Andreas, Calaveras county, California, is producing gold ore again. *Sanchez Brothers* have leased the property from which 15 tons of ore is milled daily. The vein is mined through three tunnels and has been developed to about 250 feet.

A new plant near Lompoc, California will increase production of diatomite filter aids and filters by more than 60 percent for *Great Lakes Carbon Corporation's* dicalite division. The plant is being constructed by *Kaiser Engineers* near an extensive deposit of diatomaceous silica.

Wright H. Huntley has leased *Tungstar Hanging Valley Mining Company's* mill at Bishop, California. Built in 1941, the mill is located in Pine Creek Canyon, a short distance from the U.S. *Vanadium Company's* mill. The mill has been re-conditioned for straight gravity process operations and it is planned to run 200 tons a day of old tailings and about 100 tons of tungsten ore from the Huntley mines in Tungsten City.

Diamond drilling has been started at the *New Almaden Mine*, Almaden Santa Clara county, California. The *Cordero Mining Company* has leased the property and will explore for commercial quick-silver deposits with funds granted by the DMA. Twelve mines, covering 4500 acres, make up the New Almaden group. The company plans to rehabilitate some of the old workings, install additional equipment, and conduct extensive operations if the drilling locates any important deposits.



Initial preparations have been made by the *Black Rock Mining Corporation* to move its *Northumberland* surface plant north of Tonopah, Nevada to the *Lincoln* mine at Hiko, Nevada, where it will be re-erected as a pilot plant. The Lincoln

mine has been steadily producing tungsten for the past six or seven months. Ore was trucked to Bishop, California. Because this operation was too costly, and because it was felt that the Lincoln property warrants it, it was decided to move the *Northumberland* mill to Lincoln instead.

Shipments of barite are being made from the *California-Nevada Barytes Company* property in Nye county, near Tonopah, Nevada. Three trucks are making round trips daily to the Southern Pacific Railroad at Luning, where cars are loaded for shipment to the *Chemical and Pigment Company* at Melrose, California. This year's 1,000-ton shipment is the largest ever made from the deposit.

About 125 feet of tunnel work in extending No. 6 tunnel from the 50-foot point has been completed during the last six months at *Gray Eagle* lead-silver mine near Beowawe, Nevada. An additional 400 feet will be driven to intersect the first major ore zone disclosed in the upper workings. A winze sunk last winter on a downward extension of ore in this zone, disclosed ore reportedly assaying 16 percent lead, 1.5 percent zinc, 1.8 percent copper, 40 ounces of silver, and 0.31 ounces gold per ton. The company eventually plans to install a selective flotation mill, and to extend No. 6 tunnel 1,470 feet to explore the *Sand Sutton* and *Trip-plet* deposits.

A new tin mine is being developed by the *First Uranium Corporation* in the Majuba mountains northwest of Inlay, Nevada. The new operation is reportedly turning out ore at the rate of about 300 tons daily, and about 200 tons is said to be processed daily in its new flotation-gravity mill.

Extensive development of the tungsten property in the Millett mining district north of Tonopah, Nevada, is planned by *Warfield, Inc.* which has just leased the property from Louis and Phillip Meyers and Sheriff Bill Thomas. Construction of a road to the mine is under way. Initial operation will be to explore the huge ore mass on the *Tungsten View* claim where surface indications point to a large scheelite deposit. Open pit methods may be used.

Considerable quantities of gold and silver ore are being uncovered on the 100-foot level of the *Blossom* mine in the Searchlight area of Nevada. Plans are being made by the operators, *Searchlight Consolidated Mining and Milling Com-*

pany, to expand mining operations immediately. The lowest workings in the mine at present are only 182 feet deep.

Tungsten property in Jett Canyon, Nevada is being developed by T. J. Nicely of Tonopah. He purchased the property from George Barra, Louis Cirac, and and Robert Marker. He is also exploring several scheelite prospects near Austin, Ione, and in other areas.

A sampling program is being completed by *Newmont Mining Corporation* on a tungsten property in Ophir Canyon, Smoky Valley district, outside of Tonopah, Nevada. The company has a one year option on the prospect and is building a road to it.



The work of driving the 6,000-foot crosscut from *International Minerals & Chemical Corporation's* No. 3 shaft to No. 1 shaft is now making progress. The tunnel has been driven over 250 feet south of the No. 3 shaft curving into the main line between the two shafts. About 200 feet has also been driven north of the new shaft. This will extend a total of 280 feet when completed. Tracks coming in from the main haulage line will extend into this area as tail trackage for empty cars after they have been dumped in the raise. Sinking at No. 4 shaft has entered the *Culebra* limestone at a depth of about 200 feet.

The *Anaconda Copper Mining Company* is securing mineral leases on land controlled by the *New Mexico & Arizona Land Company* in McKinley and Valencia Counties, New Mexico. Part of the area is adjacent to the uranium bearing land controlled by the *Atchison Topeka & Santa Fe Railway Company*. Anaconda has had a geologic field crew in the area for almost a year with headquarters at Prewitt, New Mexico.



Construction work has started on the new *Aluminum Company of America* aluminum smelting plant at Rockdale, Texas. It is expected that the metal-producing facilities will be in partial operation late in 1952. When full operation is reached in 1953, the aluminum production capacity of the plant will be in the neighborhood of 170,000,000 pounds annually. John D. Harper, who has been assistant manager for ALCOA's Tennessee Operations, has been named works manager for the Rockdale plant. Len B. Neubert has been transferred from Vancouver, Washington, to be construction superintendent.

The *Defense Minerals Administration* has authorized two loans for the exploration of mercury in Texas. One for \$10,000 will go to *Maradillas Minerals* in Marathon, while *Rainbow* mine at Terlingua will get \$50,000.

Construction of the new \$75,000,000 steel mill for *Lone Star Steel Company* at Longview, Texas, is progressing on schedule. Production of steel and steel pipe is expected by late 1952.



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RESERVE MINING LETS CONTRACT FOR MINNESOTA TACONITE PLANT

A decision to proceed immediately with construction of a 2,500,000-ton-per-year beneficiating plant for producing high-grade iron ore from magnetic taconite has been reached by the Reserve Mining Company. Partners in Reserve Mining are Republic Steel Corporation of Cleveland, Armco Steel Corporation of Middletown, Ohio, and National Steel Corporation of Pittsburgh. Manager of Reserve Mining Company is Oglebay-Norton & Company.

A construction contract has been awarded to a group of contractors associated for this purpose. They are the Hunkin-Conkey Construction Company of Cleveland, The Arundel Corporation of Baltimore, Maryland, and the L. E. Dixon Company of San Gabriel, California. The three have joined under the name of Hunkin-Arundel-Dixon. The venture is expected to cost in excess of \$75,000,000.

Present plans call for completion of construction in 1955 with the first operation either late in that year or in early 1956. The new plant will be located on the north shore of Lake Superior about 55 miles east of Duluth at Beaver Bay. It will be connected by a 47-mile railroad with Reserve's mining property at Babbitt, Minnesota, on the extreme eastern end of the Mesabi Range. A contract for the construction of the railroad has also been let to the same contractors.

Provision will be made in this construction program to enlarge the plant as required to a 10,000,000 ton-per-year plant. Power-plant capacity and heavy foundation work are included in the current construction project to accommodate at least part of this additional capacity.

When the plant is operating at capacity it will be necessary to mine 7,500,000 tons of taconite annually at the open pit mine now being developed at Babbitt. Primary crushing to minus-4-inches will be done in a crushing plant to be built near the open pit. The taconite will then be shipped to Beaver Bay for magnetic concentration and pelletizing before shipment to lower Lake ports. A new harbor and complete ore-loading docks will be built at Beaver Bay to handle the loading of the Great Lakes' ore carriers.

Nellie B Mines Sold To American Zinc

The American Zinc, Lead & Smelting Company has purchased the Nellie B. Mining Company, said to be the second largest producer of zinc-lead concentrates in the tristate (Missouri-Kansas-Oklahoma) mining district.

The properties consist of 1,360 acres located in the heart of the Oklahoma section of the district. At present 15 shafts are operating and three concen-

trating mills are treating between 3,000 and 4,000 tons of zinc lead ores per day.

American Zinc expects to continue operation at maximum capacity. The Nellie B mines should add about 12 percent to American Zinc's concentrate requirements.



Freeport Sulphur Company, Terrebonne, Louisiana, and Kaiser Aluminum and Chemical Corporation, Baton Rouge, and New Orleans, Louisiana, were reported eligible for accelerated tax write-offs by the Defense Production Administration. Freeport requested \$4,056,000 and received \$3,868,600 with 85 percent certified, for a new crude-sulphur plant. Kaiser's plant at Baton Rouge requested \$16,500,000 for alumina production facilities and was granted that amount, 80 percent certified; the New Orleans plant also received its requested \$75,000,000, 80 percent certified, for aluminum pig production facilities. Kaiser's tax write-offs are part of a so-called "second round" aluminum expansion program and are in addition to the expansion of these plants now in progress.

A \$14,000,000 addition to its plant improvement and expansion program is planned by Interlake Iron Corporation which should boost its production of pig iron by 23 percent. Upon completion, the company expects to increase its annual production from 1,320,000 net tons at the beginning of 1951, to 1,620,000 net tons. A large part of the program will be to modernize and to enlarge the blast furnaces at Erie, Pennsylvania, and Chicago. In addition, a second furnace in Chicago will be relined and improved. Applications for certificates of necessity have already been filed with the National Security Resources Board. This addition to the program brings Interlake's appropriations for plant improvement and expansion to about \$35,000,000 since 1948.



Appalachian Mining and Smelting Company, Embreeville, Tennessee, has been granted a \$400,000 loan by the Defense Production Administration to purchase and install equipment. The company manufactures zinc oxide and is engaged in the mining of zinc ore.

The outstanding stock of Ohio Marble Company and Piqua Stone Products Incorporated which own and operate limestone quarries at Piqua, Ohio, have been bought by Armco Steel Corporation.

Continued on page 77



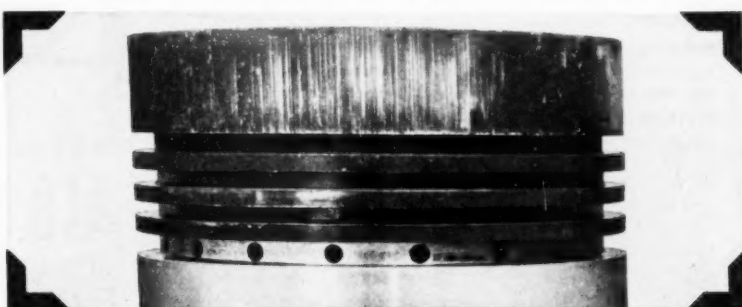
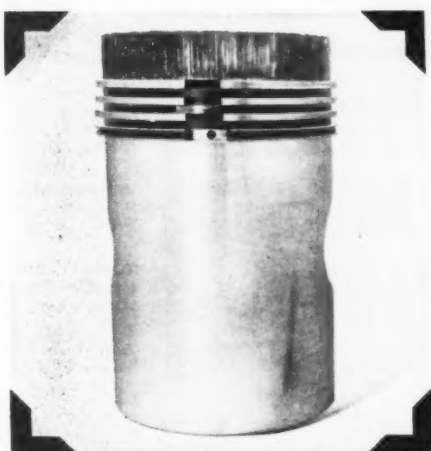
SUMP CLEANING ON THE MESABI RANGE

Cleaning the sump at the Hawkins mine, Nashwauk Village, Minnesota. This is one of the large Mesabi Range open-pit mines of The Cleveland-Cliffs Iron Company. Water, soupy clay, and iron ore collect in the pit pump and periodic cleaning is necessary so that the clear water catchment area is large enough to store normal water inflow into the pit for several days. The stored water is pumped from the pit as necessary.

STANDARD ENGINEER'S REPORT

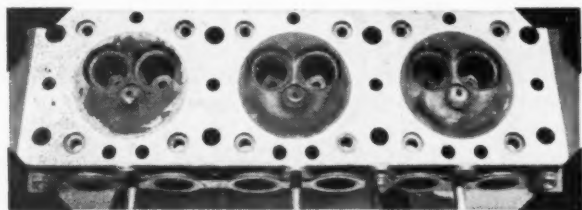
DATA	
LUBRICANT	RPM Delo Oils
UNIT	Caterpillar D13000 diesel
OPERATION	Operating 75 KW generator
CONDITIONS	Constant speed - varied loads & temp.
PERIOD	2119 hours
FIRM	Lusitania, San Diego, Calif.

Ring-sticking stopped, wear cut in heavy-duty engine

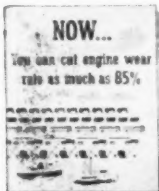


ONLY 0.0002 INCH WEAR PER THOUSAND HOURS was the average wear-rate on cylinders in the engine during the 2119-hour run, although usual drain periods were extended to 1000 hours. Oil temperatures averaged 175° F. to 180° F. Note the open oil-return holes and grooves (above) and lacquer-free piston skirt (left).

AFTER 2119 HOURS on RPM DELO Supercharged-2 Lubricating Oil, this representative piston from a D13000 Caterpillar indicates the clean condition of lubricated parts of the engine. All 24 rings in the engine were free!



CYLINDER HEAD from the engine after the run. RPM DELO Supercharged-2 is recommended specially for heavy-duty engines where fuel-sooting or other deposits, high temperatures or other conditions cause operational problems and wear.

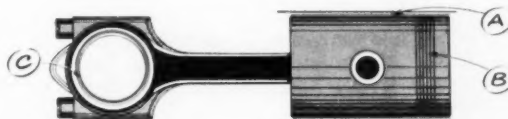


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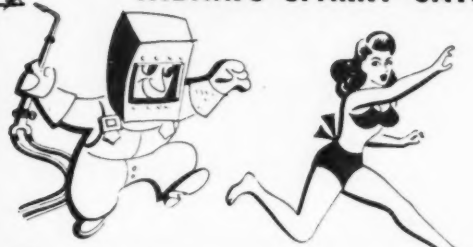
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PASSAIC

NEW JERSEY

Central Eastern News

Continued from page 74

About 25,000,000 tons of limestone are said to be available on the properties. Armco, which has been buying limestone for its Hamilton, Ohio, blast furnaces from the companies for many years, will require about 400,000 tons per year when its new \$35,000,000 blast furnace and coke oven plant are completed at Middletown, Ohio. The Piqua quarries are expected to supply that amount annually.



The M. A. Hanna Company has reported that drilling for iron ore in the Wolf Lake area near Detroit Lakes, Minnesota has, so far, been disappointing. Overburden is found to be deeper than expected from the aerial surveys—running from 450 feet to 650 feet of glacial drift. The surveys indicated large ore deposits in the area. In Michigan, a contract has been let to the Foundation Company, New York, to sink the new Cannon shaft for the Bengal-Tully property at Iron River through 130 feet of overburden to ledge. The shaft will be of concrete and 15½ feet by 21 feet. The Hanna company will complete the shaft to an eventual depth of 1,600 feet. The new shaft will be one-quarter mile east of the present Bengal mine shaft. The Foundation Company (which put down the Morton mine shaft at Hibbing, Minnesota about 40 years ago) has just completed a shaft for the Puritan Mining Company at Bessemer and has moved its men and equipment to the Cannon shaft job. It is expected to require about six months to sink the shaft to ledge and two years to complete it. Another two years of development is planned to bring the Bengal-Tully mine into production. Construction work on Hanna's new pilot plant for treating low-grade ores at the old Groveland mine near Randville, Michigan, has been completed and it is operating on an experimental basis. The company has obtained options for leases in the area, located in Sagola and Felch townships. If the experimental work is considered successful, the company will undertake an intensive study of shipping and marketing.

The Hawkins mine washing plant, second on the range and built 39 years ago, is being dismantled to be moved and re-erected at the edge of the pit. It dates back to 1912, two years after Oliver Iron Mining Company's plant at Trout Lake washed the first Mesabi range ore. During these 39 years, crude ore has been hauled two miles from the Hawkins pit to the washing plant by steam locomotives which are now almost obsolete in range mines. The Hawkins, formerly operated by the International Harvester Company, is now an operation of the Cleveland-Cliffs Iron Company.

After three months of work by repair crews in rehabilitating the old Carpenter shaft at Crystal Falls, Pickands Mather & Company officials have decided that the shaft can be made to serve the adjoining Monongehala mine if it is decided to begin mining at that property. The company also is building an ore-loading pocket for its new Rabbit Lake mine on the Cuyuna range. The ore will

be crushed before being deposited in the pocket.

The Jones and Laughlin Ore Company has been granted rapid tax amortization on 85 percent of \$9,094,000 to be spent to develop the Tracy mine at Negaunee, Michigan. With the newly erected headframe and hoisting home equipment installation completed at the mine shaft sinking has been resumed from the 100-foot depth where it had stopped in ledge. The shaft will be bottomed, for the present, at about 1350 feet where the second level will be developed. This will require about one year.

The Montreal Mining Company, subsidiary of Oglebay, Norton & Company, is sinking an inclined shaft from the 31st level and has constructed a hoist room on the 31st level of its iron mine at Montreal, Wisconsin.

The Oliver Iron Mining Company's

Fajal underground mine at Eveleth, Minnesota ceased active operations on September 1st. It was opened in 1897 by the Fajal Iron Company and was taken over by the Oliver in 1902. Later a portion of the property was stripped as an open pit mine and combined shipments from pit and underground have been more than 33,500,000 tons. Employees affected by the shut down were transferred to the Oliver's nearby Spruce mine.

The Lake Superior & Ishpeming Railroad handled a new high total of 800,000 tons of ore during August of this year. The previous record was 796,744 tons made in July 1940. The 1940 tonnage was loaded into 96 vessels, or an average of about 8,300 tons each. The record tonnage of August 1951 required 75 boats, an average of 10,667 tons, indicating the trend toward larger ore carriers on the Great Lakes.



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Climax Molybdenum Speed Storke Level Development

To speed development of the Storke level and insure increased production of molybdenum during the next five years, the Climax Molybdenum Company is considering contracting mine development in its Climax mine, Lake county, Colorado. The stepped-up scale of development is in addition to the existing contract between Climax and Gibbons and Reed Company, Inc., calling for more than 20,000 feet of Storke level development. C. J. Abrams, general superintendent, is in charge of operations at Climax. W. M. Wamsley is mine superintendent and John Petty is assistant mine superintendent.

About 400 tons per day of molybdenum ore are being produced from seven development headings in the Storke level tunnel. Crews under the supervision of W. K. McGlothlin have connected through drift Nos. 313 and 319 from the hanging wall to the footwall side of the orebody. Footwall and hanging wall headings in drift No. 317 are being driven. The hanging wall drift is being timbered because of bad ground. Drift No. 315 is also being driven from both foot and hanging wall sides with timber carried within four sets of the face. The Storke level, 300 feet below the present (Phillips) main haulage level, is being developed as the mine's future main extraction and haulage level.

Utah Quartz Crystals To Be Mined For Government

The Barite Corporation has been formed by a group of Idaho men to mine piezo electric quartz crystals on the Goshute Indian Reservation in Juab county, Utah. The corporation has signed a contract with the Federal government for sale of the crystals. The corporation is leasing 640 acres of land from the Indians and is open-pit mining to recover the quartz.

Barite officials include Ralph Gesas, president; E. A. Clawson, vice president; and Ralph J. Albaugh, secretary. All are from Idaho Falls, Idaho. Ralph M. Parsons and J. M. Riles of Los Angeles, California, are directors.

Ventures Leasing Co. Receives RFC Loan

Venture Leasing Company, Silverton, San Juan county, Colorado has procured a \$23,000.00 Reconstruction Finance Corporation mining loan. The money will be used for the purchase of milling equipment, for construction of a new, 60-ton flotation mill using portions of the company's own mill and new equipment. The mill will be located at the lower tunnel of the Gold Prince mine. Money for working capital and mining purposes will be supplied by the Leasing Company and others. The operation will be on the northeast section of the famous Sunnyside vein, a lead-



LEADVILLE TUNNEL TAPS EMMET SHAFT

The Leadville Drainage Tunnel has reached its objective—the Robert Emmet shaft of the New Jersey Zinc Company. Harry Greshuk, superintendent for the Utah Construction Company, which drove the tunnel for the account of the U. S. Bureau of Mines, is shown as the water drains into the tunnel from the shaft. The last 120 feet of tunnel was driven through blocky porphyry by a crew of 53 men. Edward Matsen, is resident engineer under J. H. East, Jr., director of the Bureau's Region IV.

zinc-gold-silver vein, which extends through the property. This ground is held under lease by Venture Leasing Company from the Sunbank Corporation.



The Bonita Mining and Development Company, Inc. has announced plans for a long range development program at its *Pride of Bonita* and *Minnehaha* mines at Gladstone, San Juan county, Colorado. Henry P. Ehrlinger, general manager, of Silverton will direct the program. The development work at the *Pride of Bonita* will consist of the extension of the No. 1 adit tunnel eastward to cut the Royal Oak vein on Bonita ground and the Norman vein of the Ross Basin mine on ground owned by the *Ross Basin Mining Company*. Rehabilitation of the *Minnehaha* adit portal will be followed by stoping of lead-zinc-silver ore. Equipment and supplies are being taken to the mines to insure uninterrupted development during the winter months.

A crew of 11 men are reportedly reopening the *Henrietta* mine on Cement Creek, San Juan county, Colorado. The portal of the lowermost cross cut adit is being retimbered and 200 feet of the crosscut timbering is being repaired.

The Beryllium Mining Company, Inc. is employing a crew of three men at its open pit beryl-mica-columbite mine on Quartz Creek, Gunnison county, Colorado. C. A. Wemlinger is in charge of the work. Mining of the pegmatite is facilitated by the use of a D 4 Caterpillar tractor which is used in moving the blasted waste rock from the core deposits. Mica production averages about 7 tons per month, beryl and columbite production is quite variable.

W. E. Haldane, president of the *Uranium Ore Producer's Association*, has again outlined a plan to assure the continuation of an adequate supply of uranium-vanadium ore to the rapidly expanding milling capacity on the Colorado Plateau. He recommended "a speed up in assaying of ore lots at the custom mills, and early and extensive access road building program to many of the isolated mines and increased exploration by government agencies." He further reported that "uranium miners aren't going to get rich from the new (special bonuses). The better mines have already produced 10,000 pounds and are therefore not eligible for the payments."

The *Molybdenum Corporation of America* has a crew of men working at its *Urad* molybdenum mine in Clear Creek county, Colorado under the supervision of Charles Harrington of Idaho Springs. One crew is repairing and remodeling the flotation mill and a mine crew is driving a short tunnel through which to divert the south fork of Clear Creek around a new tailing storage area below the mill.

The *New Jersey Zinc Company* has optioned the Doctor group of claims in the Spring Creek district northeast of Gunnison, Colorado, from John Lamberton of Gunnison. New Jersey Zinc is making a detailed geologic study of the claims and diamond drilling favorable geologic areas. Lamberton has shipped high-grade lead ore from the Star for a number of years.

The *Bachelor Development Company* has a crew of six men at its *Bachelor* mine three miles north of Ouray, Colorado. Julius R. Sonza of Ouray is supervising operations. Development work including winzining from the Khedive level and drifting eastward along the Bachelor vein-dike is being done under the terms of a contract with DMA.

Isabella Mines Inc. is reopening the Lee shaft on Bull Hill in the Cripple Creek mining district. James H. Keener, company secretary-treasurer, is directing the work. Initial mine development will be on the 7th level where drifting north on the Klondyke vein to its intersection with the Oxide, Big Basalt and Isabella dikes is planned. Drifting to the south on the Klondyke vein should intersect the Cheyenne vein. Isabella Mines officials include William Kyner, president, Franklin Ferguson, and Charles Carlton, all of Cripple Creek.

The *American Zinc, Lead and Smelting Company* is continuing development work at its leased *Caledonia* mine in San Juan county, Colorado. Development ore is trucked 24 miles to American Zinc's *American No. 1* custom lead-zinc mill in

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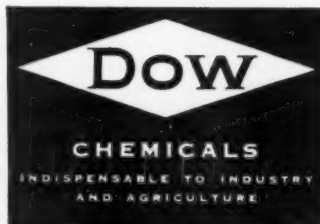
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Ouray. Donald M. Spencer is supervising the development work.

The first Colorado Plateau uranium-vanadium "special bonuses" have been paid to Colorado and Utah miners according to Frank H. MacPherson, manager of the *Colorado Raw Materials Office* of the *United States Atomic Energy Commission*. The special bonus, which equals the basic payment per pound of uranium oxide in each ton of ore, applies to the first 10,000 pounds in ore containing 0.10 percent or more shipped since March 1, 1951. First payments were made to the following: *Vanadium Queen* claim in the La Sal Creek mining district, Grand country, Utah, operated by Ave Day of Moab; *Socko* No. 2 and *Little Eva* claims operated by Loyal A. Sutherland of Thompsons; and the *Black Ape* Nos. 1 and 2, and *Lucky Day* claims of Eli Malich of Thompsons. Sutherland and Malich claims are in the Yellow Cat district, Grand county, Utah. First bonus payments for Colorado mines were to Walter Gramlich, Paradox, Colorado, covering the *Morning* and *Evening Star* claims on La Sal Creek, Montrose county; and the *Big Maverick* and *Arrowhead* claims of Dan E. Kelley in the Calamity district, Mesa county.



F. A. Sitton, prominent uranium-vanadium mine operator of Dove Creek, Colorado, has acquired a large group of uranium bearing claims in Grand and San Juan counties, Utah. The claims are west of the Colorado River and East of the Green River. Uranium-copper bearing Shinarump conglomerate crops out in Mineral Canyon and Oil Basin. Mine development and prospect drilling is under way to develop enough ore to warrant an extensive truck-road building program.

Metal Producers, Inc. has reopened its 400-ton-per-day flotation plant at the leased *Horn Silver* mine near Milford, Beaver county, Utah. The mill is treating stockpiled lead-zinc sulphide ores until mine output is brought up to mill capacity. A three-year development program in the mine has indicated ore for continuing capacity mill operation. Jack Lowe is superintendent and Dan Peacock is manager.

The new sulphuric acid plant of *Garfield Chemical Company* at Garfield, Utah, is producing 250 tons of 100 percent sulphuric acid daily. The company is a subsidiary of *Kennecott Copper Corporation* and the *American Smelting and Refining Company*, and converts SO_2 bearing smelter gases into the acid. P. H. Hutchinson is plant superintendent.

The *United States Geologic Survey* has published a preliminary aeromagnetic map of the Iron Springs mining district, Iron county, Utah. The map outlines promising areas for detailed prospecting for iron ore.

Applications have been made to the federal government for sodium prospecting permits on 5,000 acres of land in T. 36 S., R. 17 W. in Iron county, Utah. The acreage is between Modena Beryl Junction and Enterprise. According to reports, William Rogers of St. George first discovered sodium in the area 14 years ago.

MINING WORLD

precipitates — NORTHWEST

GSA Establishes Montana Depots To Buy Manganese

General Services Administration has announced it will establish manganese-buying depots at Butte and Philipsburg, Montana, to purchase an estimated 600,000,000 pounds of the strategic metal.

According to Lester Noble, Helena, chairman of the Montana State Resources Board, the program was designed to get small operators to deliver small lots of manganese that otherwise would not be marketed. Purchases will be made in lots as small as five tons.

The government will pay "considerably more—maybe twice as much—than the going price of manganese," he said, to encourage further exploration and development of manganese orebodies.

To avoid delay in payments, the program called for giving operators sales slips in return for ore delivered to the depots. The sales slips could be cashed at any bank.



Apache Mining Company is expanding operations at its property in the Mineral Hill district, near Hailey, Idaho. At last report, the firm's mill was producing 80 tons of concentrates daily from silver-lead-zinc-gold ore being taken from the mine and old dumps. Frank Humphreys is in charge of operations.

Big Creek Apex Mining Company stockholders have approved an agreement with Silver Syndicate, Inc., on division of lead-silver ore originating in Silver Syndicate's Rambo area and raking westerly into Big Creek Apex ground in the Coeur d'Alene "silver belt" near Kellogg, Idaho. Sunshine Mining Company, which has operating agreements with both companies, will get 50 percent of the ore; Big Creek Apex 37½ percent and Silver Syndicate 12½ percent. The ore enters Big Creek Apex ground at about the 3,840-foot level.

United Engineers, Inc., Boise, Idaho, is reported planning an extensive diamond-drilling program at its recently acquired Empire mine near Mackay, Idaho. The Empire once was Idaho's largest copper producer and reportedly employed 300 men during World War I.

Banner-Idaho Mines, Inc., recently organized at Wallace, Idaho, has taken over assets of a defunct Washington corporation, including five patented claims adjoining Hecla Mining Company's Atlas development in the Mullan (Idaho) district. The firm has signed an operating agreement with Hecla, according to J. W. Coumerilh, Mullan, secretary-treasurer.

J. V. Grismer, veteran prospector and mine operator in the Coeur d'Alene mining district of north Idaho, and associates have organized Fortune, Princeton and Eastern Lead Mining Company to develop three groups of claims east of Mullan, Idaho. Grismer currently is in charge of a zinc-lead-copper development near Tonopah, Nevada, for American Mining and Oil Company.

Idaho Goldfields, Inc., is stepping up

development work at its Fourth of July Canyon property east of Coeur d'Alene, Idaho. A mucking machine has been purchased to speed progress in driving a new creek-level tunnel on a vein containing a 20-inch wide paystreak of \$100 a ton lead carbonate ore, according to W. M. Fredericks, Spokane, Washington, president. A combination blacksmith shop and machine shop is under construction. A new compressor house will replace an old one which is being converted into a bunkhouse.

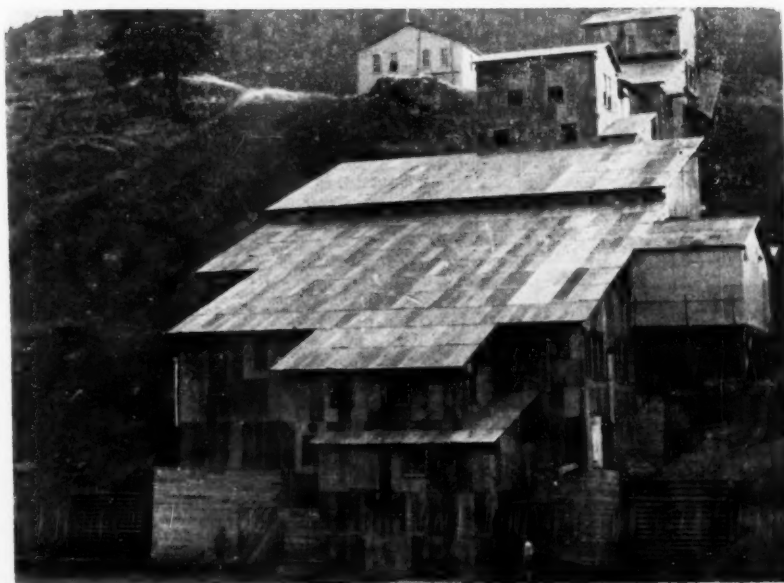
Former Idaho Congressman Compton I. White of Clark Fork, Idaho, has received DMA approval of a \$57,310 copper exploration project at the Clarinda Copper property in Bonner county, Idaho. The Clarinda is near the Whitdelf lead-silver mine, headed by White. DMA also approved a \$36,000 lead exploration project at the property of Hope Silver-Lead Mines, Inc., adjoining the Whitdelf. Glen C. Lee of Pasco, Washington, is president of Hope-Silver-Lead.

A 200-foot raise above the 3,000-foot level on No. 2 vein has been completed by Silver Summit Mining Company. Exploratory drifting will now be done at the 2,800-foot horizon. Station cutting at the new level is reported to be underway and drifting to the east and to the west is expected to be started soon. Ralph Neyman, general superintendent of Hecla Mining Company, is also general manager of the Summit subsidiary.

Satisfactory progress is reported by Highland-Surprise Consolidated Mining Company on its \$200,000 Defense Minerals exploration program. An advance of 75 feet has been made in an easterly

ALDER GOLD-COPPER COMPANY PLANS ZINC RECOVERY

Pictured here is the 300-ton-per-day mill of the Alder Gold-Copper Company one mile south of Twisp, Washington. Ore for the mill is trucked four miles from the company's open-pit mine. Copper-gold concentrate is trucked directly to the Tacoma, Washington copper smelter of the American Smelting and Refining Company. Zinc content of the ore is increasing in depth and a zinc concentrate will soon be made, as the mill was designed and built for eventual zinc recovery in addition to copper-gold. With the economic limit of open-pit mining being reached, plans and underground development have been readied for long-hole blasting of 40- by 50- by 20-foot blocks of ore underneath the pit. The Spokane, Washington company has been in operation since 1947 and now controls about 500 acres of mining claims in the area. E. Royce of Spokane is president and Harvey F. Stone is treasurer and general manager.



METAL AND MINERAL MARKETS

METALS

October 20

COPPER:	Electrolytic. Delivered F.o.b. cars, destination U.S.A.	24.50¢
	Lake. Delivered, destinations U.S.A.	24.625¢
	Foreign Copper. New York	27.50¢
LEAD:	Common Grade. New York	19.00¢
	Foreign lead. New York delivery. (Import price ceiling)	19.00¢
ZINC:	Prime Western. East St. Louis	19.50¢
	Foreign zinc. East St. Louis delivery. (Import price ceiling)	19.50¢
	Primary 30 pound Ingots (99% plus). F.o.b. shipping points	19.00¢
ALUMINUM:	Bradley Mining Co.'s Elk Brand 99.5%. F.o.b. Cascade, Idaho	50.00¢
ANTIMONY:	Lone Star Brand. F.o.b. Laredo, in bulk	42.50¢
BISMUTH:	(In ton lots) price per pound	\$2.25
CADMIUM:	Sticks and bars. 1 to 5 ton lots	\$2.55
COBALT:	97-99%, keg of 550 pounds	\$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	24.50¢
MERCURY:	Flasks. Large lots, New York	\$220.00
NICKEL:	"F" Ingots (5 pounds). F.o.b. refinery, Port Colborne, Ontario	\$6.50¢
TIN:	Grade A Brands. New York	103.00¢
TITANIUM:	(98.5%). F.o.b. Beverly, Massachusetts	\$7.00
GOLD:	United States Treasury price	\$35.00 per ounce
SILVER:	Newly mined domestic. United States Treasury price	90 1/2¢ per ounce
	Foreign. Handy & Harman	88.00¢ per ounce
PLATINUM:	.....	\$90.00-\$93.00 per ounce

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	\$35.00 per unit
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr ₂ O ₃	
	3 to 1 chrome-iron ratio	\$42.00-\$43.00
	African (Transvaal). 48% Cr ₂ O ₃	\$34.00-\$35.00
	Turkish. 48% Cr ₂ O ₃ . 3 to 1 chrome-iron ratio	\$50.00-\$51.00
	U. S. Government ore purchase depot Grants Pass, Oregon. Base price, lumpy ore, \$115.00; fines and concentrates \$110.00 for 48% Cr ₂ O ₃ and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr ₂ O ₃ and a 2 to 1 ratio.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports.	
	Mesabi, Non Bessemer, 51.5% Fe	\$ 8.30
	Mesabi, Bessemer, 51.5% Fe	\$ 8.45
	Old Range, Non Bessemer	\$ 8.55
	Old Range, Bessemer	\$ 8.70
MANGANESE ORE:	Metallurgical grade. 45 to 46% Mn. Long ton unit	\$1.05 to \$1.15
	Chemical grade. 80% MnO ₂ . Per ton	\$60.00
	Chemical grade, domestic, 70% MnO ₂ , F.o.b. mines	\$45.00
	U. S. Government ore purchase depot Deming, New Mexico. Base price, \$6.10 per long dry ton for 15 % ore. Price increasing to \$76.00 for 40% ore. U. S. Government purchase depot Butte, Montana. Base price, \$6.05 per long dry ton for 12 % ore. Increasing to \$40.42 for 30 % ore. U. S. Government purchase depot Phillipsburg, Montana. Base price, \$6.43 per long dry ton for 15 % ore. Increasing to \$34.81 for 30 % ore.	
MOLYBDENUM CONCENTRATE:	90% MoS ₂ . F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	\$1.00
TUNGSTEN CONCENTRATE:	60% WO ₃ . Per short ton unit	\$65.00
URANIUM ORE:	Carnotite-Roscoelite. F.o.b. purchase depot plus \$0.06 per ton mile (maximum of \$6.00), Rifle, Naturita, Uravan and Durango, Colorado; Salt Lake City and Monticello, Utah. Base price for 0.10% ore is \$1.50 per pound and ranges to \$3.50 per pound of contained U ₃ O ₈ plus \$0.75 per pound for each pound in excess of four pounds per short dry ton and an extra allowance of \$0.25 per pound for each pound in excess of 10 pounds. A development allowance of \$0.50 per pound is paid for all ores purchased.	
VANADIUM ORE:	Carnotite-Roscoelite. V ₂ O ₅ content, up to 10 pounds, in uranium ore paid for at \$0.31 per pound in ratio of 10 parts V ₂ O ₅ to 1 part U ₃ O ₈ .	

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	\$12.50
	Oil Well grade. Packed in 100 pound paper bags	\$14.00
FLUORSPAR:	Metallurgical grade. 70% effective CaF ₂ content per short ton F.o.b. Illinois-Kentucky mines	\$43.00
	Ceramic grade. Minimum CaF ₂ content, 95%	\$45.00
	Acid grade. 97% CaF ₂	\$60.00
PERLITE:	Crude: F.o.b. mine per short ton	\$3.00 to \$5.00
	Plaster grades. Crushed and sized. F.o.b. plants per short ton	\$7.00 to \$9.00
	Concrete grades. Crushed and sized	\$6.00 to \$8.00
SULPHUR:	Long ton, F.o.b. Gulf Coast mines	\$22.00

Quotations on metals and certain ores through the courtesy of American Metal Market, New York, N.Y.

drift from the 1,300-foot level to explore the easterly extension of the *Surprise* vein and the faulted portion of the *Highland* ore body. Short crosscuts are being driven from the *Surprise* vein on the 1,450-foot level for down-hole diamond drill stations.

Ruby Meadows Mining Company, Idaho county, Idaho, is said to have been awarded a 90 percent DMA exploration loan for monazite. The project is for \$14,053 and the government's share is \$12,647.

McRae Tungsten Corporation is reported to be exploring for tungsten in Valley county, Idaho, under a \$20,351 DMA project.

Extension of the new lower crosscut at the *Paymaster* mine west of Arco, Idaho, has progressed 415 feet and is continuing at the rate of about 200 feet per month. Some 400 feet of additional tunneling will take the face to its first objective, the downward extension of a strong vein structure which produced about 20,000 tons of lead-zinc ore from upper workings during World War II. The new crosscut will gain about 325 feet of depth on the structure. Ernest Lomas, formerly with *Sunset Minerals Inc.*, is in charge of operations. *Spokane-Idaho Mining Company* has a 75 percent interest in the property.

Lucky Friday Silver-Lead Mines Company has acquired 90 percent of the mineral rights to the *Jutula Homestead*, 160 acres located east of Mullan, Idaho. This gives *Lucky Friday* additional holdings east of its present orebodies now being mined in that direction. Exploration and development work will probably start from the 2,000-foot level of the *Lucky Friday* mine.

Further diamond-drilling exploration work is planned by *Lookout Mountain Mining and Milling Company* in the eastern part of its *Pine Creek* property, Idaho. Work is now in progress on a 250-foot drift around an old caved slope on the *Lookout* vein to provide access to about 1,100 feet of east drift which is presumed to be open. About 135 feet of the by-pass drift has already been completed. In the last 25 feet, an unexpected ore structure carrying quartz and galena mineralization was encountered.

Hypocheek Mining and Milling Company has started drilling in the face of the north surface tunnel on the company's *Pine Creek* property, Idaho. Driven in former years, the tunnel follows a narrow ore seam for 300 feet. It is now being extended 100 feet, with ore in the face.

Coronado Copper and Zinc Company has acquired controlling interest in the recently incorporated *Cortez Silver Lead Corporation*, organized in Wallace, Idaho. The *Cortez* property covers more than 2,500 acres of mineral ground, acquired by outright purchase, by mining locations, by lease and option, by purchase of mineral rights, and by lease from the State of Idaho. It adjoins *Atlas Mining Company* on the northeast and east, extending across the Montana border to the old *Amazon-Dixie* mine. Northerly holdings lie near Pottsville. *Coronado* has a controlling interest in *Silver Banner Mining Company*, also, and officers of the two companies will now be the same.

Snoose Mining Company has acquired the *Dickie No. 1*, *Dickie No. 2*, *Hot Shot*, *Margaret*, *Wasp*, *Buddy*, *Black Hornet*, *Buzzard*, and *Baltic* unpatented mining claims in the Mineral Hill district of south central Idaho from Fred E. and

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Johanna Povey. The company has been granted \$67,500 by the DMA on a \$135,000 exploration project for development of the company's property including the above newly acquired claims. The work will consist of (1) rehabilitation of the present shaft, (2) extending the crosscut on the 200-foot level, (3) drifting 1,000 feet on the 100- and 200-foot levels, (4) sinking a winze from the 200-foot level, and (5) drifting and/or crosscutting 1,500 feet on structure intersected above. To meet the DMA loan requirements, it is reported that the company offered a non-assessable stock issue, over half of which was taken up by the directors.



DMPA advanced \$60,000 in working capital to the North Butte Mining Company of Butte, Montana. The company will enlarge its leaching operations to turn out 7,000,000 pounds of copper annually. DMPA will be repaid through delivery of \$60,000 worth of copper, at the rate of 24¢ cents per pound.

Mitchell Mining Company recently started shipping two cars per week of ore from the old Margaret Ann claim outside Butte, Montana, according to President Ernest Olmsted of Mount Vernon, Washington. Production is coming from a raise on the 300-foot level. Reopening of the old workings was started last year.



The Current Creek antimony property owned by Dragich and Amundsen, Prineville, Oregon, is being developed by Mike Dragich and two miners. The property is eight miles east of Ashwood. At present, principal work is in No. 3 tunnel where stibnite has been found in several places in veins from three to eight feet wide. In tunnel No. 1, a crosscut 48 feet wide was made in the same type of ore.

The Lady Frances mine of Dant & Russell, Inc., Dantore Division, at Frieda, Wasco County, Oregon, is producing at capacity. The perlite is being mined by open-pit methods, and processed to make both plaster aggregate and acoustical tile at the plant adjacent to the mine.



Gold Gulch Mining Company is stockpiling gold ore averaging better than \$45 a ton at its recently acquired property in central Washington's Blewett district, according to John B. Youngman Jr., Coeur d'Alene, Idaho, president. The ore is coming from two old rehabilitated tunnels.

Chewelach Copper Company has been formed to reopen the old United Copper mine, near Chewelah, Stevens county, Washington. Incorporators were J. Wal-

ter Hebert and Bert Dunn of Yakima and Gordon LaVigne of Chewelah. Miners started work recently cleaning out the haulage level of the one-time largest copper-producer in Washington state.

Admiral Consolidated Mining Company of Spokane, Washington, has taken over operation of its Admiral Consolidated mine at Leadpoint, Washington, in Stevens county, from John Colby, veteran operator of the district. Under an operating agreement signed early last year, Colby had produced about 100 tons of zinc concentrates.

Stevens county, Washington, has another new producer in the Scandia mine, owned by Raleigh Hallenius and Theodore Nasburg, both of Spokane. About 15 tons of zinc ore is being stockpiled daily, according to Hallenius. The ore is being mined from a drift along a vein which will be driven 100 feet, under a 12,000 DMA exploration program. Recent drift assays averaged 9.1 percent zinc over a 7-foot face. The DMA program also calls for sinking 50 feet on a zinc outcropping running 30.7 percent zinc over a 4-foot width and 50 feet of exploration from the shaft bottom. The shaft work will be contracted. The Scandia was located 25 years ago but exploration previously was mostly limited to annual assessment work.

The old Cleveland mine in Stevens county, Washington, has been leased by Spokane-Idaho Mining Company from Stuart Compton, Bayview, Idaho, and Walter Johnson, Davenport, Washington, on a 50-50 profit-splitting basis. According to Frank N. Marr, Spokane, president of Spokane-Idaho, new mining machinery will be installed as needed and exploration undertaken to determine the extent of known ore bodies and to find new ones. An estimated 15,000 to 20,000 tons of zinc-lead ore is reported available for mining in the former producer of antimonial-lead ore. Operations will be directed by J. C. Kieffer, general manager of Spokane-Idaho's Constitution mine, a zinc-lead producer of north Idaho's Coeur d'Alene district. William E. McCoy is in charge of the crew. Spokane-Idaho also is developing the Paymaster lead-zinc mine in southern Idaho, acquired last May.

The Tungsten Mining and Milling Company of Spokane, Washington, recently started milling old dumps at the Germania mine, Stevens county. Some remodeling has been done at the old Germania mill and more is planned. Paul H. Casey, Spokane, is the company president and manager; Henry Becker, mill superintendent.

The Columbia Lead and Zinc Company's property in the Metline district of northeastern Washington is to be developed more fully. The lead-zinc mineralization disclosed by the 1400 feet of long-hole drilling recently completed will be tested at depth by downholing from the tunnel in the southwest part of the property. The 20-foot shaft northwest of the tunnel is to be deepened. Robert P. Wallis, Spokane business man, is the newly-elected president and general manager of the company.

H. C. O'Brien, real estate broker in Newport, Washington, has engaged a diamond drilling firm to explore a lead-zinc showing on property at Jim Creek, eight miles northwest of Ione, Washington. A \$30,000, gravel-surfaced, mine-to-market road has just been completed into the area where lead, zinc, and silver ore was recently discovered. Mr. O'Brien has leased over 600 acres and has staked additional ground.

MINING WORLD

Cripple Creek

Continued from page 45

a standard gauge road, reached the district from the Springs and with its arrival Cripple Creek became a tourists' paradise. In 1903 two electric lines connected Cripple Creek and Victor—the High Line running over the hilltops that separate the two camps and the Low Line around the edge of the same hills. Labor troubles in 1894 and again in 1903 closed the mines but the hotbed of the strike activities centered around Victor.

Between 1894 and 1900 new camps appeared in the district—Goldfield, Gillett, Anaconda, Arequa, Mound City, Independence, Elkton, Cameron, Altman and Victor.

Victor was called the "Core of the Cripple Creek Mining District" for the biggest mines were located on the fringes of the city. The two greatest were the Independence and the Portland.

In 1903 a drainage tunnel was driven to unwater the lower levels of the big mines of the district. It was so successful that a larger project was begun—the Roosevelt drainage tunnel which was completed in 1910. Laterals were later run from it to tap various hills so that by 1914 the general water level of the district had been lowered by several hundred feet. The big mines continued to dig deeper until they were below the level of the Roosevelt tunnel and water collected in their shafts. To cut pumping costs the Golden Cycle Corporation began to drive a still deeper tunnel, the Carlton tunnel, to connect with the Portland shaft and ultimately with the Cresson, Ajax and Vindicator mines. The seven-mile bore was completed in 1941 and two days later the properties tapped were dry.

The Cripple Creek district's newest development is the Golden Cycle's Carlton Mill which has just been completed near the old Elkton property to supersede the great mill formerly conducted by the company near Colorado Springs.

Statement of Ownership

Statement of the ownership, management, and circulation required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 253), of Mining World, published monthly; semi-monthly in April, at Bristol, Connecticut, for October 1, 1951.

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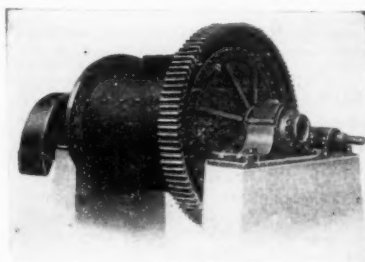
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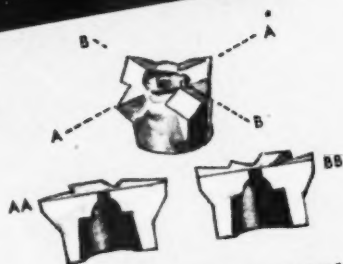
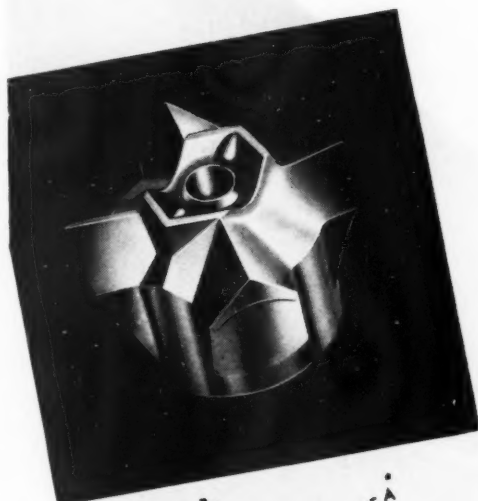
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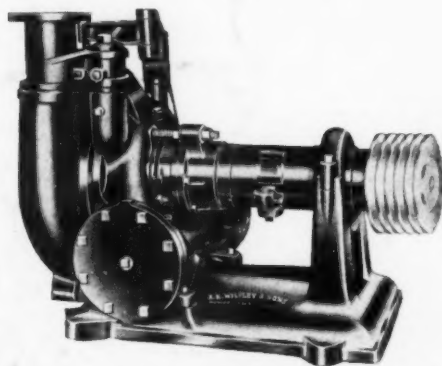
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